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Supreme Court of the United States

October Term, 1963

No. 293

Carl W. Mullis Engineering and Manufacturing Company, Inc., *Petitioner*,

versus

Thomas W. Nicholson, *Respondent*

PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE FOURTH CIRCUIT

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versus

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PETITION FOR A WRIT OF CERTIORARI

Petitioners, Carl W. Mullis, Sr. and Carl W. Mullis Engineering and Manufacturing Company, Inc., seek review of the Decision of the United States Court of Appeals for the Fourth Circuit, in so far as such decision held petitioner's patent No. 2,908,302 invalid as to claim 8 thereof.

REPORTS OF OPINIONS BELOW

The decision of the United States Court of Appeals for the Fourth Circuit is published at 315 F. 2d. 532, and is also published at 137 USPQ 13. The decision of the District Court is published at 200 F. Supp. 396 and at 132 USPQ 590.

JURISDICTION

The decision of the Court below, review of which is sought here, was filed on March 6, 1963. A petition for rehearing was filed on April 4, 1963 and was denied on April 25, 1963.

Jurisdiction to review the judgement below is believed to be conferred on this Court by title 28 USC 1254 (1).

QUESTION PRESENTED FOR REVIEW

The question presented for review is as follows:

Was it proper for the United States Court of Appeals to hold claim 8 of Mullis patent 2,908,302 invalid where:

(1) The District Court had found the claim valid;

(2) The patent relied on by the Court of Appeals in holding the claim invalid was one of those considered by the Examiner in the United States Patent Office;

(3) The expert for the party attacking the validity of the patent admitted that he had never seen any machine embodying the combination claimed in the patent;

(4) The construction and operation of the patented machine was fully explained to the District Court in oral testimony;

(5) No evidence was introduced by the party attacking the validity of the patent as to the equivalency of the structure shown in the prior patent to that covered by the claim held invalid by the Court of Appeals; and

(6) The Judge of the District Court actually saw the patented machine.

CONSTITUTIONAL PROVISION

The constitutional provision which the case involves is as follows:

> Art. 1, Sec. 8. The Congress shall have power . . . To promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries.

STATUTORY PROVISIONS

The statutes which the case involves are as follows:

> 28 U. S. C. 1338. *Patents, copyrights, trade-marks and unfair competition.* (a). The district courts shall have original jurisdiction of any civil action arising under any Act of Congress relating to patents, copyrights and trade-marks. Such jurisdiction shall be exclusive of the courts of the states in patent and copyright cases.
>
> 28 U. S. C. 1291. *Final decisions of district courts.* The courts of appeals shall have jurisdiction of appeals from all final decisions of the district courts of the United States, the United States District Court for the District of the Canal

Zone, the District Court of Guam, and the District Court of the Virgin Islands, except where a direct review may be had in the Supreme Court.

28 U. S. C. 1292. *Interlocutory decisions.* (a) The courts of appeals shall have jurisdiction of appeals from:

(4) Judgments in civil actions for patent infringements which are final except for accounting. . . .

35 U. S. C. 282. *Presumption of validity; defenses*

A patent shall be presumed valid. The burden of establishing invalidity of a patent shall rest on a party asserting it.

35 U. S. C. 102. *Conditions for patentability; novelty and loss of right to patent*

A person shall be entitled to a patent unless—

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States,

STATEMENT OF THE CASE

(1) Procedure Below

This suit was originally filed by Thomas W. Nicholson as plaintiff against Carl W. Mullis Engineering and Manufacturing Company Inc as defendant charging infringement of two patents owned by Nicholson. The petitioner herein, Carl W. Mullis Engineering and

Manufacturing Company Inc. and the intervenor, Carl W. Mullis, Sr., president of the corporation and inventor and owner of patent number 2,908,302, counterclaimed against Nicholson for infringement of claim 8 of such patent.

It is because petitioners here, the holders of the patent, were the defendants below that we have referred above to Nicholson as the party attacking the validity of the patent.

Hereinafter, the parties will be referred to as Mullis and Nicholson respectively.

After a full trial on the merits, the District Courts found that the claim 8 of the Mullis patent, the only one in suit, was valid and was infringed by a machine being manufactured by Nicholson. Such machine was substantially different from the machines shown in the Nicholson patents on which the suit was originally instituted. The District Court also found that the Nicholson patents were not valid and were not infringed by the Mullis machine. Nicholson thereupon appealed to the United States Court of Appeals for the Fourth Circuit, which after argument, held that the District Court was correct in every respect except in its holding that claim 8 of the Mullis patent was valid. The Court of Appeals held that this claim was invalid in view of a Brundell patent number 2,786,499, which had been one of the patents relied on by Nicholson in attacking the validity of the Mullis patent. A copy of the Brundell patent is attached to this petition.

The Brundell patent was, as is shown by the list of references at the back of the Mullis patent, a copy of which is attached to this petition, cited and relied upon by the Examiner in the Patent Office during the prosecution of the application resulting in the Mullis patent.

(2) The Mullis Patent

The Mullis patent 2,908,302 relates to a device for removing bark from logs. In this device, the logs are fed lengthwise through a rotating drum by feed rolls which prevent the logs from rotating. The drum has on its interior a set of inwardly directed arms carrying debarking tools, which scrape the bark off the log as it passes through the drum.

This general type of log debarking device was not invented by Mullis.

The Mullis machine, as best seen perhaps in Fig. 5 of the patent, includes a rotating drum of annular shape, indicated at 104.* Pivoted at 212 on a framework which rotates with the drum are the arms 216, which extend inwardly towards the center of the drum. At their inner ends, these arms carry debarking tools or scrapers 224, 228.

The arms are pushed inwardly by pistons 250 (see Fig. 8) slidable in cylinders 232 set into the inner wall 106 of the drum 104. These pistons are connected by the piston rods 252 to the arms.

In operation, the rotating tank 104 is filled with air under pressure. This air acting on the pistons 250 exerts an inward pressure so as to hold the tools against the logs. However, because of the compressibility of the air in the tank, the arms are capable of being pushed outwardly.

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* Reference characters referred to herein are encircled in red on the copies of the patents.

The arms are askew shaped as is shown in Figs. 7 and 8. That is, they have a backwardly curved edge. The purpose of this is to enable the arms to the opened by oncoming logs, since the logs push against the slanted edge of the rotating arm, and the slanted curved edge causes the arm to be cammed outwardly, until the tools can come up on th[illegible]. They are then pressed against the log by the pressure in tank 104 acting through pistons 250.

The result of this is that, whether or not the logs follow close upon each other, any log arriving at the drum will cause the tools to open to receive it, and then will pass through the drum and be debarked.

In prior devices using gas under pressure as a source of the force needed to hold the tools against the log, the usual construction had been one in which the gas was supplied from a stationary source, which required rather complicated sealing arrangements between the drum and the stationary frame, which were expensive and subject to substantial leakage. Mullis on the other hand has a self contained source [illegible] gas under pressure within his tank, so that the necessity of complicated sealing arrangements is avoided.

Likewise, Mullis avoids the necessity, which was usual in prior constructions having an outside source of gas under pressure, of having any valve arrangement for supplying gas under pressure to the ring in such a way as to produce the opening of the arms so that they can open and then engage against the outside of an oncoming log.

(3) The Brundell Patent

The Court of Appeals found claim 8 of the Mullis patent invalid in the light of the Brundell patent 2,786,499.

That patent shows a ring type of debarker. In Fig. 1, the ring is indicated at 10 and has pivoted arms 13 which carry scraping tools at their inner ends. These arms are askew, that is, they will be automatically opened by an oncoming log.

However, in order to furnish the pressure needed for holding the tools against the log, Brundell uses rubber bands shown at 28 in Fig. 1.

In the modifications shown in Fig. 1b of Brundell, the rubber band is shown at 148. In this modification, cylinder 140 contains a liquid, such as oil, and the rubber band is connected by a rod 144 to a piston 142 within the cylinder 140. There are provided as many of these cylinders 140 as there are arms, each connected to the arm through a rubber band. The cylinders are interconnected by a pipe 160, so that, as in Mullis, there will be equalization of pressure between the various rubber bands.

The rubber bands act on arms 26 (Fig. 1b) which are connected to the shafts 20 which carry the arms 13.

In the Brundell patent, the force for holding the arms inward so as to force the tools against the log is provided by the stretching of the rubber bands. The oil in the cylinders 140 is incompressible, and serves merely as a mechanical connection between the various rubber bands to maintain them at substantially the same tension. This is true because oil is an incompressible material, and cannot act as a source of pressure in any way comparable to the compressible air which is used in the Mullis machine and which furnishes the resilient pressure necessary for holding the tools against the logs.

GROUNDS FOR GRANTING CERTIORARI

The Decision of the Court of Appeals in this case constitutes the decision of a Federal question in a way in conflict with applicable decisions of this Court, and also so far departs from the accepted and usual course of judicial proceedings as to call for an exercise of this Court's power of supervision.

(1) Case Was Not Submitted Purely On Documentary Evidence

The Court of Appeals, in relying on that case, said, in respect to the holding of validity by the lower Court:

> "His [the District Court's] conclusion was not evolved from conflicting testimony but rather upon a comparative reading of the patents. Inasmuch as these documents are equally as available to us, the resolution of the question of patent validity by the trial court is not as binding here as would be a factual ascertainment upon varying evidence under Rule 52(a) F.R. Civ. P., Kiwi Coders Corp. v. Acro Tool & Die Works, 250 F. 2d 562 (7 Cir., 1957). Our examination convinces us that Brundell's patent, No. 2,786,499, filed March 22, 1954, issued March 26, 1957 clearly anticipated Mullis."

Petitioner submits that the law as laid down in *Kiwi Coders Corporation* v. *Acro Tool and Die Works*, is improperly applied in this case.

In the present case, the Court actually saw the Mullis machine after the trial and before rendering his opinion. Likewise, there is evidence by Nicholson's own witness, Holekamp, (App. 3a, 4a, 5a)* who was quite well acquainted with the machines in the field, and who apparently was familiar with the Cambio Machine constructed according to the Brundell patent, that he had never seen a machine having the various features of the Mullis machine in combination. And Mullis himself testified to the structure and operation of the Mullis machine (App. 5a to 29a, especially 21a to 22a). Thus there was evidence before the District Court from which it could be concluded that there was a substantial difference between the Brundell machine and the machine of the Mullis patent, and the Appellate Court's conclusion that its action in reversing the District Court was justified because the case was dependent purely on documentary evidence is unwarranted.

(2) Presumption of Correctness of Lower Court's Findings

It hardly seems necessary to cite authority to the fact that the District Court's findings and conclusions are not to be set aside unless clearly erroneous.

As this Court said in *Graver Tank Co. v. Linde Air Products*, 336 U.S. 271, at pages 274, 275, 279, this applies as well to findings in favor of the patent as to findings against the patent. The Court there said:

> "Rule 52 (a) of the Federal Rules of Civil Procedure provides in part: Findings of fact shall not be set aside unless clearly erroneous, and due regard shall be given to the opportunity of the trial court to judge the credibility of the witnesses.

* * * * * * * * *

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* The appendix contains all that part of the transcript relating in any way to the Mullis patent.

> To no type of case is this last clause more appropriately applicable than to the one before us, where the evidence is largely the testimony of experts as to which a trial court may be enlightened by scientific demonstrations.
>
> * * * * * * * * *
>
> The rule requires that an appellate court make allowance for the advantages possessed by the trial court in appraising the significance of conflicting testimony and reverse only "clearly erroneous" findings. These are manifestly supported by substantial evidence and the Court of Appeals found them supported by the weight of the evidence—indeed found the evidence to warrant support of the patent even in matters not found by the trial court.
>
> * * * * * * * * *
>
> The same deference is due to the findings of the trial court which overturn claims as to those which sustain them."

And, as the Supreme Court held in *Commissioner* v. *Duberstein*, 366 U.S. 278, at page 291.

> "The rule applies itself also to factual inferences from undisputed basic facts."

The District Court drew the conclusion from the facts that the Mullis patent was valid.

It is true that the District Court made an error in failing to appreciate that the Brundell patent showed in Fig. 1b an arrangement in which the pressure on the arms was equalized by an interconnection between them. However, the Court also found that *Brundell applies the force to the arms by a separate rubber band or the like for each arm* (Finding 60). This in itself distinguishes the subject matter of claim 8, which the

District Court characterized as having a source of pressure fluid carried by the ring, and more particularly, as the Court stated in its opinion:

> "Mullis devised a machine which incorporated a number of features which Nicholson's own expert admitted he had never seen before in combination. It has a source of pressure fluid carried by the ring, so that no outside supply is needed, and there are no sealing joints required between the ring and the stationary part of the machine. The source is connected to all cylinders so that the pressure is equalized on all the tool-carrying arms. The arms are "askew", that is, they have curved front edges so that, when the butt end of a log strikes them, they open automatically and apply the tool to the log.
>
> No patent in the prior art and no machine known to plaintiff or his expert, has a self-contained reservoir of pressure fluid in the ring connected to all the cylinders with self-opening askew arms. This combination was new and I find the Mullis patent valid."

We submit then that, despite the fact that there was an error in one finding of the District Court, this error was irrelevant and immaterial, since there is no evidence in the record whatsoever that the rubber bands of Brundell, which furnish the force for pressing the tools against the log, are in any way the equivalent of the reservoir of compressed air which Mullis uses.

The party Nicholson did not choose to do any more before the District Court than merely put in evidence the patents on which he relied to invalidate claim 8 of Mullis. No evidence was offered by him as to the applicability of the references to the claim, and there was no showing of that of claim 8 of Mullis. We submit that under these circumstances an Appellate Court is not warranted in upsetting the opinion of the District Court.

We further submit that the opinion of the Court of Appeals in this respect is entirely unwarranted by the facts. The Court was clearly in error in stating "Brundell used rubber bands as a connection to hold the cutting arms and tool in place". The rubber bands of Brundell *are not used as a connection at all but as a force supplying means.* Brundell can raise the tension of these rubber bands by forcing liquid into the cylinders, which is equivalent to moving the pivot points of the rubber bands by an adjusting arrangement such as is shown in Fig. 1a. However, in both cases *it is the rubber bands themselves which furnish the force.*

This is clear from the specification of the Brundell patent, which in column 1, line 29 refers to "The use of solid elastic materials for the actuation of each tool"; and in lines 37 to 38 where he refers to the fact that "the stretching of elongate elastic material will produce tensile stress". In line 41 he refers to the "resilient elastic force". In column 3, lines 67 to 68, Brundell states that the "endless rubber band constitutes an elastically deformable means for applying force to the tools during debarking". In the claims, for example in column 5, lines 71 to 72, the patentee calls for a "solid elastic-rubber material means . . . for applying a resilient turning and actuating force to each of the shafts".

It is thus clear that the language of the Brundell patent belies the position of the Court of Appeals.

(3) The Mullis Patent Claim Should Be Interpreted To Hold It Valid If Possible

Claim 8 of the Mullis patent uses the term "a fluid under pressure". While this might conceivably be interpreted to mean a liquid under the pressure of a rubber band, we submit that, in conjunction with the specification which discloses a gas only, it should be construed to mean a gas, and this was what the District Court below meant, we submit, when it referred in its opinion to "a source of pressure fluid". And it is not necessary to interpret the term "fluid under pressure" in claim 8 of Mullis to include a liquid in order to make out infringement of the Mullis patent by Nicholson, since Nicholson's Accumat machine also uses a gas under pressure.

Patent claims should be construed to validate them if possible, and recourse to the specification and drawing is proper to determine the concept intended by the language of the claims.

This has been the constant position of this Court (*Coupe* v. *Royer*, 155 U.S. 565, 577).

In *Scherbatskoy* v. *United States Steel Corp.*, 287 F.2d 552, at page 556, the Court (USCA 7th) said:

> 'And, in the instant case, recourse to the specification and drawing was proper, if not necessary, to determine the concept intended by 'relative motion', 'indicating the displacement', 'indicating various portions', and 'distinguishable characteristics' in the context in which such phraseology was employed. Cf. Permo, Inc. v. Hudson-Ross, Inc., 7 Cir., 179 F.2d 386, 388; Grubman Engineering & Mfg. Co. v. Goldberger, 2 Cir., 47 F.2d 151.'

See also the decision of the Fourth Circuit in *Long Mfg. Co.* v. *Holiday*, 246 F.2d 95, 99:

> "'(1) An inventor has a right to define specific terms as used in a patent; and while the drawings and specifications may not enlarge the scope of the claims, they may be considered in determining the inventor's definition of the terms he employed. Black & Decker Mfg. Co. v. Baltimore Truck Tire Service Corporation, 4 Cir., 40 F.2d 910; Hutzler Bros. Co. v. Sales Affiliates, Inc., 4 Cir., 164 F.2d 260; City of Grafton, W. Va. v. Otis Elevator Co., 4 Cir., 166 F.2d 816'."

(4) Presumption of Validity

The patent statute, 35 U.S.C. 282, states that a patent is presumed to be valid. And this presumption is recognized as being strengthened where, as here, the prior art has been considered by the Patent Office as is shown by the list of references on the back of the Mullis patent.

This rule has been recognized by this Court, in *Hildreth* v. *Mastoras*, 257 U.S. 27. It is recognized in all the ten circuits, and specifically in the Fourth Circuit (*Brown* v. *Brock*, 240 F.2d 723, 727).

CONCLUSION

It is submitted that, where the party attacking the patent has chosen not to present any evidence showing the equivalency of what is shown in the prior art to what is claimed, he should not be allowed to benefit from this to the extent of obtaining a holding of invalidity in the Court of Appeals on the basis of the theory that his part of the case is dependent solely on documentary evidence.

Especially he should not prevail when there is evidence presented by the patent owner, and where reversal of the District Court runs contrary to the presumptions *both* of the correctness of its findings *and* of the validity of the patent, strengthened by the consideration by the Patent Office of the prior art relied on by the Court of Appeals.

Respectfully submitted,

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APPENDIX TO PETITION FOR WRIT OF CERTIORARI

EXCERPTS FROM TRANSCRIPT OF TESTIMONY

1A James A. Holekamp, first being duly sworn, testified as follows:

Direct Examination

By Mr. Beach:

Q. Will you please state your full name, Mr. Holekamp? A. James Alfred Holekamp.

The Court: How do you spell it?

The Witness: H-o-l-e-k-a-m-p.

Q. What is your address? A. My address is 109 West Milton Street, Sylacauga, Alabama.

Q. What is your occupation? A. I am a forester and forest engineer.

Q. By whom are you employed? A. Employed at the present by the American Pulpwood Association.

Q. What kind of an organization is that? A. This is a trade association.

Q. Can you explain what you mean by a trade association in this instance? A. This trade association has principally a five-fold program: first, technical program; second, safety and training, forest labor; third, pulpwood statistics; fourth, forest management; and a legislative program. [33]

Q. Generally, who are members of this association? A. Members of this association are pulp and paper companies, pulpwood dealers, pulpwood contractors, pulpwood producers.

Q. In other words, this is a non-profit organization of people in the pulpwood industry? Is that correct? A. Yes, sir.

Q. Over what area does this association cover? A. This association serves paper companies and those others in pulpwood production operating in every state in this country or forestry agents in this country * * * [34]

• • • • • • • • • • •

2A Q. What is your educational background, Mr. Holekamp? A. 1943, I was awarded a Bachelor of Science degree in Forestry from the Forestry School, University of Michigan, Ann Arbor, Michigan; 1946, same university, I was awarded a Master of Forestry degree.

Q. Were you employed between 1943 and 1946? A. Most of those years were spent in Naval service.

Q. What was your first employment following your graduation with the Master's degree? A. First employment was with the Boniface Lumber Company in northern Michigan. This is a company—this was a company that was owned outright by Kimberly-Clark Corporation, a Wisconsin corporation. [35]

Q. What were your duties as such an employee? A. My duties were those of a logging engineer, forest engineer. And my work dealt with the operation of—the operation of testing, the analyzing of new type logging, pulpwood logging, equipment and techniques.

Q. When did you leave that employment? A. 1949, I was transferred to Alabama where I was moved into the pulp and paper mill complex in the section called Wood Yard and Wood Room.

Q. When you say you were transferred, does that mean you continued your employment for the same company? A. Yes, sir.

Q. Where were you located in Alabama, now? A. The mill is located in Childersburg, Alabama. I reside approximately seventeen miles from that mill, in Sylacauga.

Q. How did you happen to become employed by the American Pulpwood Association? A. They were seeking a logging engineer with my technical background and experience.

Q. When did you become employed by the Association? A. January 1, 1952.

3A Q. To what duties were you assigned when you became employed by the Association? A. My duties are principally three-fold: first, to study, analyze, make recommendations concerning new and [36] promising techniques of operation and equipment pertaining to the harvesting and utilization phase of pulpwood production. Secondly, I carry out a job of making sure that our industry is well aware of new and promising developments. Thirdly, to some extent, I provide a liaison between our industry as to its needs and the manufacturers of equipment we are to use.

Q. Do you recall what any of the earlier projects were on which you worked after you became employed by the Association? A. One of the very earliest undertakings was this program of chips from sawmill waste.

Q. What do you mean by chips from sawmill waste? What were the chips for? A. The chips are used for pulp and paper manufacture. These chips are manufactured from bark-free slabs and edgings and, to some extent, trimming blocks, trim ends.

Q. What was the program at the time you became employed by the Association as far as the use of chips was concerned? A. At the time I was employed by the Association, the industry was using an estimated 60,000 cords of chips—60,000 chip—60,000 units of chips from this source.

Q. What do you mean by a unit? A. A unit of chips by our terminology is usually 5,000 pounds of green pine chips. This 5,000 pounds of green pine chips has about the same solid wood content as [37] is found in a stacked cord of rough, green pine pulpwood.

Q. Do you consider that this quantity of chips was adequate for the pulp industry? A. Yes, sir. * * * [38]

• • • • • • • • • •

30A Q. Before you saw the Mullis machine, which I believe you said was in the early part of 1957, had you ever seen any other log debarking machine which had automatically opening arms—that is, arms opened by the impact of the log—powered by a reservoir so that there was no connection to an outside source of fluid pressure . . .

Mr. Beach: If your Honor please, this is improper . . .

Mr. Bailey: I'm sorry, Mr. Beach, I haven't finished my question. I'll be glad . . .

Mr. Beach: I'm sorry.

The Court: Go ahead and finish the question.

Q. . . . and with equalization of the pressure on all four—or on all the tools carried by a rotating wing?

Mr. Beach: Your Honor please, I object to this question because it's improper cross-examination and counsel is apparently now trying to prove the case—his case of counterclaim.

The Court: He has a right to do that by cross-examination of this witness. I thought—that was my understanding about—is that the object of your question?

Mr. Bailey: Your Honor, the object of my question . . .

The Court: Is that the object of your question [100]

Mr. Bailey: . . . is primarily to—that this witness has testified and in a sense compared the Nicholson machines and the Mullis machine and made sketches of the Mullis machine; he has testified as to what he had seen in the past; and it seems to me it's perfectly proper for me to ask him if he had ever before seen a machine that had the characteristics of the Mullis machine.

The Court: I think so. Objection overruled. Have you or not?

31A The Witness: Will you please restate that question?

Mr. Bailey: Will you read the question back?

The Court: No, repeat the question.

Q. Did you ever, before you first saw a Mullis machine ever see a log debarking machine of the rotary ring type with a plurality of tools, movably carried by the ring, on arms which were capable of being impacted by the log, and opened by the presence of the log itself, in which the power was supplied by a source of fluid pressure carried by the ring itself with an equalized action on all four—on all the tools? A. To answer your question, you've got three points there. I will tackle them one at the time.

Q. Now, I'm asking you if you ever saw a machine . . .

The Court: No, no, wait a minute. He said [101] he will tackle them one at the time. I will let him answer it that way. Go ahead.

Mr. Bailey: Very well, your Honor.

The Witness: As regards other make debarkers with tools that have this self-opening feature, there was another debarker on the market in 1957 and shortly before. Second phase of your question: as I interpret it, deals with your chamber, air chamber, for the storage of compressed air. There was no other debarker to my knowledge on the market incorporating that principle. The third point dealt with the feature of equalization of pressure on each debarking tool. There were other debarkers on the market at that time with that feature, one of which was the Nicholson.

The Court: Now—pardon me for saying this, but I never can tell exactly when you are through. Are you through now?

The Witness: Yes, sir.

The Court: What counsel's question was, did you ever see one with all three of those? I presume your answer would be, "No."

The Witness: No, sir. * * * [102].

• • • • • • • • • •

80A C. W. Mullis, Sr., first being duly sworn, testified as follows:

Direct Examination

By Mr. Beach:

Q. Will you please state your full name, Mr. Mullis? A. Carl Wilson Mullis.

Q. What is your occupation? A. I am in the sawmill business and the machinery business.

Q. What is your address? A. Lancaster, South Carolina; Post Office Box 470.

Q. Are you familiar with log barking or debarking machines? A. Yes, sir.

Q. When did you first become acquainted with such machines? A. About 1955. I saw the first machine, I believe maybe I saw the Andersson debarker in 1952 or '3. I believe I did.

Q. What machine do you have reference to as having seen in 1955? A. It was a flail-type machine known as the D-3, made by the Soderhamn Company.

Q. Are you familiar with the Nicholson RotoBarker machine? A. I am to a certain extent, yes, sir. [185]

Q. When did you first learn about that machine? A. In the latter part of 1955 or first part of 1956. I believe Christmas of 1955, around that time.

Q. Did you ever consider purchasing such a machine? A. I did.

81A Q. Did you take any steps towards that end? A. I did.

Q. Will you please describe what you did? A. I placed an order with the Wilco Manufacturing Company for such a machine with the provision that I had 30 days in which to cancel the order.

Q. Did you cancel the order? A. I did.

Q. Why did you cancel the order? A. Because I had arrived at an idea where I could make a machine of my own.

Q. Did you make such a machine? A. I did.

Q. When did you make that machine? A. We started to work on it in January of 1956. We had it in operation by June, 1956.

Q. Where was that machine installed? A. At our plant in Lancaster, South Carolina.

Q. Do you have any drawings of such machine or photographs or other descriptive material? A. We have drawings of the machine, yes, sir. [186]

Q. Will you please supply such photographs and drawings as you may have.

(Mr. Bailey hands documents to witness.)

Mr. Beach: If your Honor please, it might save the Court's time if we simply selected drawings and introduced them in evidence. I might say I think most of these drawings are drawings that were exhibits in the deposition of Mr. Mullis and we could simply introduce them, perhaps, with very little testimony if this would be agreeable.

The Court: That would be very nice. You can introduce them all in evidence now and pick out the ones tonight, the ones you want to introduce in the morning.

Mr. Beach: I have gone through them, your Honor.

The Court: Have you already got them?

Mr. Beach: Yes, I think I could pick them out.

The Court: All right, go ahead.

(Discussion)

82A Q. (By Mr. Beach) Can you find exhibit marked "A" in your deposition, Mr. Mullis? A, B, and C. (Addressing counsel) Mr. Bailey, did you find Exhibit O?

Mr. Bailey: I haven't as yet, Mr. Beach.

Q. And drawings P and W. A, B, C, P and W. I would like to have you take a look at each of those drawings, [187] A, B, C, P and W, Mr. Mullis, and identify them as being drawings either of this first machine which you mentioned or of a later machine. Please state which they are. A. This is marked "A." Drawing "A." Exhibit "A."

Q. Now is that your first machine or is that a later machine? A. It's marked obsolete. It's the picture of an arm like we made it at one time.

Q. Was that the first machine? A. That was on the first machine.

Mr. Beach: I ask that that drawing be marked Plaintiff's Exhibit 12. Make it 12-A.

(Drawing of Mullis machine marked for identification as Plaintiff's Exhibit 12 A.)

A. This is Plaintiff's "P."

Q. Is that of the first machine or is that a drawing of a later machine? A. This is a drawing of a 36-inch debarker which is a later machine. The first machine only made it in 30.

Mr. Beach: I ask that that be marked as Plaintiff's Exhibit 12-B.

(Drawing of Mullis machine marked for identification as Plaintiff's Exhibit 12-B.)

(Note: See Page 189. Another exhibit entered in place of this exhibit and same number assigned.) [188]

A. This is marked Plaintiff's Exhibit "B."

Q. You are sure that is not "C"? Was the last one "B"? A. The last one was "P".

Q. I'm sorry. I wanted them in order, if I might. If this is —I understood you. Is this one "B"? A.
83A. This is "B".

Q. And is this a drawing of the first machine or of a later machine? A. It's a tracing of the drawing of the first machine.

Q. And it does not apply to later machines? Is that correct? A. Well, in general, yes; but in particular, no. It's practically the same thing but not exactly the same thing.

Q. Can you point out the differences or are the differences indicated on the drawing? A. Differences are indicated on the drawing.

Mr. Beach: I would like this marked 12-B.

(Mullis drawing marked for identification as Exhibit 12-B for Plaintiff.)

A. You want Drawing "P" brought back?

Q. Let's leave it there a moment. Number C, if you will look at it next. A. This is Plaintiff's "C" and it shows the infeed, outfeed and center section of the first machine that we [189] built.

Q. That does not apply to the later machines? A. Well, the feed works are different. The center section is practically the same

Mr. Beach: Then I would like to have that marked as Plaintiff's Exhibit 12-C.

(Drawing of Mullis machine marked for identification as Plaintiff's Exhibit 12-C.

Q. Then "P" which . . .

The Clerk: Already been marked.

Q. . . . you have identified. Let's mark that 12-D. That, I believe you said, applied to a later machine? A. I believe so.

(Drawing of Mullis machine marked for identification as Plaintiff's Exhibit 12-B.)

84A A. This is a later machine. It's for the 36-inch debarker. It shows the arms and center section, tank and pistons and the connections between the arms and pistons.

Q. Will you look at drawing Exhibit "W" please, and tell us whether or not that applies to only the first machine or to later machines or both? A. This is Plaintiff's Exhibit W and it shows the tool for a 26-inch machine which is relatively the same that we [190] use in a 30-inch or 36 except that it's a shorter tool. The width of the angle is the same.

Q. Was this used on the first machine or on later machines? A. This was used—well, we used one with a different bevel on the first machine as I recall.

Mr. Beach: I ask that that drawing be marked as Plaintiff's Exhibit 12-E for identification.

(Drawing of Mullis machine marked for identification as Plaintiff's Exhibit 12-E.)

Q. Was the first machine which you have mentioned and installed at your plant modified later in conformance with these later drawings? A. Yes, I believe it was. The machine we have at the plant now is a different machine from the first one. It is the later machine, 36-inch.

Q. You heard Mr. Holekamp testify and he stated that he took pictures yesterday at your plant. Have you had an opportunity to look at those pictures? They are Plaintiff's Exhibits 5-A to E inclusive and 7-A to E inclusive. Will you examine those pictures and tell me whether they do show the machine that is at present at your plant? A. It looks like the same machine. They are all the same. It looks like our machine.

Mr. Beach: I will ask if counsel will help [191] the witness to select photographs, Exhibits F, I, J, L, M and N. Will you hand those to the witness please? (Mr. Bailey hands photos to witness.)

Q. These also were photographs that were introduced as exhibits in connection with your testimony in your 85A deposition. Do you recall those? A. Yes, sir, and they show the full machine. Just not the rotary ring part of the machine. These show the full or almost all of the full machine, the square machine as it is made, constructed.

Mr. Bailey: For identification purposes, your Honor, I would like to state that those are photographs taken by me of a Mullis machine at Battleboro, North Carolina, some two years ago. I don't remember the exact date. We admit, in other words, that they are pictures of a Mullis machine.

The Court: All right.

Mr. Beach: I would like to have those identified, then, as Plaintiff's Exhibits 12-F, G, H, I, J, and K respectively.

(Photographs marked for identification as Plaintiff's Exhibits 12-F, G, H, I, J, and K.) * * * [192]

* * * * * * * * * * *

Mr. Beach: I would like to offer in evidence these photographs and drawings Exhibits 12-A to 12-K inclusive.

Mr. Bailey: No objection.

The Court: All right.

(Exhibits 12-A to 12-K inclusive, previously marked for identification, received into evidence as Plaintiff's Exhibits of these numbers.)

Mr. Beach: In addition, your Honor, I would like—well before we go to these others, (addressing the witness) let me ask you, Mr. Mullis, in connection with these photographs, Plaintiff's Exhibits 12-F and 12-K, they are all of the same machine? Is that correct? A. Yes, sir.

Q. Do you have them available for your reference there? A. They are the machine at Battleboro, so Mr. Bailey says.

Q. So that these photographs do not show the first machine which was installed at your plant at Lancaster? Is that correct? A. No, this doesn't show the first one. [194]

Q. Does this show a machine like your present machine at Lancaster? A. Similar, except this is a 30-inch model.

86A Q. And this is practically the only difference? The construction in general is the same? A. That's right. Difference in size of the log that it will take.

Mr. Beach: Then, we have here four advertising brochures that I would like for the witness to examine and they are the deposition exhibits S, T, U and V.

Q. Do you recognize those brochures, Mr. Mullis? A. Yes, sir, we've sent out literally thousands of them.

Mr. Beach: I'll ask that these be identified as Plaintiff's Exhibits 13-A, B, C, and D respectively, corresponding to the deposition exhibits E, T, U and V. And I will offer these documents in evidence as the exhibits of those numbers.

(Advertising brochures received into evidence as Plaintiff's Exhibits 13-A, B, C, and D.)

Mr. Beach: I will ask that these books be handed to the witness.

Q. Mr. Mullis, do any of these documents, Plaintiff's Exhibits A to D inclusive, show the machine at Battleboro or one comparable to it shown in the photographs, [195] Plaintiff's Exhibits 12-F to 12-K inclusive? A. Well, the 13-A shows a machine similar to the one at Battleboro.

Q. Where do you find it on that 13-A Exhibit? A. I beg your pardon?

Q. Where do you find the machine shown on the 13-A exhibit? A. On the front.

Q. Do you find any other pictures of that machine in that exhibit? A. Picture of the center section, and the machine on the inside cover.

Q. Are all of the photographs shown in that Plaintiff's Exhibit 13-A of the same machine? A. Well, one of these machines is a machine down in Alabama. I'm not sure which one the front it. It could have been any one of a number of machines we sold.

87A Q. I mean, of the same type of machine? A. Same type, yes, sir.

Q. Are the machines shown in Plaintiff's Exhibit 13-B the same as the machine shown in Plaintiff's Exhibit 13-A? A. No, sir.

Q. That is a different type of machine? Is that correct? A. That is what we call a Thin Line.

Q. Are all of the photographs shown in Plaintiff's Exhibit 13B of the same machine or the same type of [196] machine? A. Yes, sir.

Q. Are the machines shown in Plaintiff's 13-C all the same throughout that exhibit, if there are pictures in it? A. That is correct. That is for the 30 and 36-inch machine.

Q. Does that machine correspond to either of the machines of the brochure Plaintiff's Exhibit 13-A or 13-B? A. Corresponds to the machine shown as 13-A.

Q. Does the Plaintiff's Exhibit 13-D relate to more than one type of machine? A. Only the one type, the Thin Line 26-inch.

Q. Is that the same as the Plaintiff's Exhibit 13-B machine? A. That is correct. It is.

Mr. Beach: I offer these exhibits in evidence as exhibits of those numbers, 13-A to 13-D.

Mr. Bailey: No objection.

(Brochures received into evidence; previously noted on page 195.)

Q. Are the pictures and descriptions of these four exhibits, Plaintiff's Exhibits 13-A to 13-D accurate for the machines as they are today? A. They are. [197]

Q. Can you state when you first produced the machines of Exhibit 13-A and C?

(Discussion as to exhibits.)

A. What was the question? Q. When the machines of
13-A and 13-C were first constructed? A. I be-
88A lieve these machines were first sold in 1958.

Q. When were the machines of the Thin Line type, shown in Exhibit 13-B and 13-D first constructed. A. In the early part of 1959.

Q. Exhibits 12-F and 12-K correspond to the machine of Exhibits 13-A and 13-C? Is that correct? A. That's correct.

Q. Do the drawings Plaintiff's Exhibits 12-C, D and E correspond to the same machine, namely, the one of the photographs, or that type? A. The drawings?

Q. The drawings. And you may examine them to verify them. A. No, I think I have said they were the older machines.

Q. 12-C, D and E, I think you said, were of the later type. I am not asking about 12-A and B. Please verify that before you answer. (Papers to witness.) A. 12-D refer to the 36-inch machine which is covered by . . . [198]

Q. Mr. Mullis, I asked about 12-C, 4 and E, not 12-B. A. I said, "D."

Q. I'm sorry. I misunderstood you. 12-D corresponds to what again? A. To 13-A and C. It is the center section of the machine.

Q. What about 12-C? A. 12-C is for the . . .

Q. As far as the center section is concerned? A. The center section is practically the same.

Q. How about Exhibit 12-E? A. 12-E shows the tool used in the 26-inch machine known as the Thin Line. It is also used in the 30 and 36-inch Western type model except that it is longer.

Q. And the general type of tool would correspond to both of these machines . . . A. Yes, sir, it would.

Q. . . . that you describe. I think it may not be
89A necessary to refer you again to the drawings but you may look at them if you wish. Do you recall whether all of the notations on the drawings are notations made by you in your own handwriting? A. It looks—it appears to be so, yes, sir.

Q. At the time that your deposition was taken? A. Yes, sir. [199]

Q. Would you state what your education has been, Mr. Mullis, please? A. I have a high school education only.

Q. What do you mean by the Western type feed works you mentioned a few minutes ago? A. Well, that is shown by the picture. It's a heavy, rugged, more rugged type than the older model was. The first machines we built had lighter shafts, and so forth in them.

Q. Why did you call it the "Western" type feed works? A. Well, sounded good, I guess. Anything comes from the West sounds good.

Q. Perhaps at this time it would be desirable to inquire about this tool marked Plaintiff's Exhibit D and ask you if you can identify that tool. This is the number that was given at the time of taking Mr. Mullis' deposition. A. This is a tool we use in the machine. It is for a Western type machine. It's longer than the 26-inch tool, is the only material difference.

Q. That is not a new tool is it? A. I'm not sure.

Q. Will you please examine it and see whether you can state? A. Looks like it's got the imprints of screws that hold the tool in and it's made an indentation in the tool. Therefore, I would assume that it has been used. [200]

Mr. Bailey: I might state that tool is a used tool. It was taken from the matchine at Battleboro, North Carolina, in my presence.

The Court: All right.

90A Mr. Beach: I will ask that this tool be marked for identification as Plaintiff's Exhibit 14 and offer it in evidence as the exhibit of that number.

The Court: You want it in evidence?

Mr. Beach: Yes, your Honor.

(Tool from Mullis machine received into evidence as Plaintiff's Exhibit 14.) * * * [201]

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(Enlargements of photographs of Lancaster installation of Mullis machine received into evidence as Plaintiff's Exhibits 7-AA to 7-EE, inclusive.)

Q. (By Mr. Beach) Since the witness is familiar with the machine, I am going to hand him the set of photographs, Plaintiff's Exhibits 7-A to 7-E inclusive and to the Court [206] Plaintiff's Exhibits 7-AA and 7-EE, inclusive, which are simply enlargements of these earlier photographs. Now, Mr. Mullis, referring you first to the photograph Plaintiff's Exhibit 7-B, I believe you testified yesterday that this did appear to be your machine? Is that correct? The one in Lancaster? A. Yes, sir, the only thing, you haven't taken a picture of anything but just the hole and the ring around it.

Q. It's just the barking ring itself? A. But the outside center section is where the machine . . .

The Court: What, now? Seven what? Referring to what?

Mr. Beach: 7-B, your Honor.

The Witness: The second picture.

The Court: All right.

Q. Do you recognize the background that you can see through the ring there, to identify it as being at your mill?

The Court: What do you call the rings?

The Witness: That's the round, circular . . .

The Court: I see.

The Witness: The picture just shows that and doesn't show that ours is built in a square frame and this is the— just a hole in it.

91A THE COURT: I know what you mean. The question he asked you is whether or not you can see through the ring in the background? [207]

THE WITNESS: That is looking—this is on the outfeed side, looking through and I could see houses through there that I recognize.

Q. And this does identify the location of the operation at your plant? A. Yes, sir.

THE COURT: That does show—that is the picture that was taken at the location of your plant?

THE WITNESS: Yes, sir. That picture was.

THE COURT: I understand. Go ahead.

Q. You identified the ring. Can you identify the scraper blades or tools. A. The skinning tools is—the four tools around this peak.

Q. You are pointing to the four tools right in the middle of the picture? A. That's correct, that would hit the log first if there was a log in the center of the ring.

Q. Now, how are they supported, Mr. Mullis? A. They are put in there in a slot. There's a beaded arm, these tools fit in a slot, they are held in by screws, cap screws, set screws, on the back of the tool. The are removable.

Q: And the arms . . .

THE COURT: Is that the set screws there you are talking about? [208]

THE WITNESS: No, that's here on the front.

THE COURT: You mean the set screws on the end of the arm.

THE WITNESS: I don't know whether we can see it. I think maybe it's an Allen screw—could be.

Q. The arms of which you speak are supported in what manner? A. They are made in an arc shape: it's a segment of a true circle. It goes back to a pivot point
92A in the steel reel, fastened to this pivot in the steel
reel. It's removable: the pivots on each side that it pivots on, you can take them out to remove the arm.

The Court: It's fastened to what?

The Witness: It's fastened to the pivot point, to the pivots.

Q. Where you say the steel reel that you mentioned, that's the same as the ring, isn't it? A. Well, we call it a steel reel. That's our designation of it.

Q. You mentioned a ring a while ago. A. It is a circle. The steel reel is made in a circle; therefore, could be called a ring.

Q. And you do speak of your machine as a ring-type barker, do you not, or debarker? A. Well, that's the general term of the trade. It's [209] known as a ring debarker. Soderhamn calls theirs a ring type and all the rest—Budlow—and others.

Q. And you call yours a ring-type? A. It would be called a ring-type, yes.

Q. When you say that the arms are mounted on pivots on the ring or reel, what's the purpose of those pivots? A. That's to hold the arm in place from that end and let it pivot around the log to open and close for the biggest or smallest log that you might have.

Q. In other words, that's to enable the tools to be adjusted in position so that they can contact the surface of either a small log or a large log? Is that correct? A. That's right. This arm is made up on an askew angle that allows the incoming log when it hits it, regardless of the size, presses against that arm and opens it. That is something that is not true in Nicholson. I mean the older machines.

Q. I would appreciate it if you would confine your answers to the questions, Mr. Mullis. That isn't the point in issue in this particular situation. Now, is the—are 93A the arms pressed against the log or are they pressed so as to press the tools against the log? A. They are.

Q. How is that pressure on the arms accomplished? A. By a piston rod.

Q. Can you point out the piston rod in this photograph, Exhibit 7-B or plaintiff? [210]

The Court: Suppose you give him these and let him look at it as he points. Go ahead.

The Witness: This is the piston rod.

The Court: All right.

Q. Now, how is that mounted, Mr. Mullis? A. That's attached to the arm at approximately the center of the length of the arm.

Q. How is that attached? A. Well, it's attached with a pivot—pivotable—a shaft around which this arm works. It has a bearing, the arm has a bearing in it that works around this pivot shaft. * * * [211]

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Mr. Beach: The witness has placed on the drawing one designation which reads, "9¾ inches" between the arm pivot on the ring and the piston rod pivot on the arm.

The Witness: "13½"

Mr. Beach: He has written, "13½ inches" in a line between the pivot point of the piston rod on the arm and the log-engaging edge of the tool.

The Court: Center of the log. I think he mentioned center.

The Witness: Center of the tool.

Mr. Beach: Yes, sir, of the tool, and these have been put in in green ink. Now, Mr. Mullis, you have designated in red connecting—piston connecting rod, or connecting rod, rather in red ink during the taking of your deposition? Is that correct. A. That's right. [218]

Q. One end of this connecting rod is pivoted to the arm? A. That's right.

Q. At the location on which you have given the 94A dimension? A. That's right.

Q. How is the other arm connected and to what? A. The other arm?

Q. The other end of the arm. Excuse me. The piston rod—the connecting rod, rather? A. The connecting rod is connected to the arm in the inner periphery of the reel. And the . . .

Q. Do you mean to the arm in the reel? A. Yes, to the arm inside of the reel.

Q. That's what we might call the inner end of that connecting rod? Is that right? A. Well, either one could be called inner; I don't know. It's the one that connects to the arm. One end connects to the arm and the other to the piston.

Q. Now, you have designated in red during the taking of your deposition, "piston." A. Yes.

Q. How is it connected to the piston? A. With a pin.

Q. In other words, that's a pivot point? A. Yes, sir, pivot joint.

Q. Do you find—I notice on the drawing that there is [219] an arrow that reads, "counter-clockwise" and giving the direction of rotation. A. This is the direction of rotation standing from the outfeed side. The direction from infeed side is clockwise.

Q. But this does refer to the rotation of the ring rather than the rotation of the log? Is that right? A. Yes, sir, that's the rotation of the ring but it rotates—our ring rotates clockwise, standing from the infeed end of the log on the other side.

Q. Would it make any difference to the operation of the machine whether the ring rotated clockwise or counter-clockwise or is that just a matter of design? A. This design, it cannot rotate counter-clockwise and feed the log through it.

95A Q. But you could design . . . A. Sure you could . . .

Q. Turn it around . . . A. . . . design it to go the other way, yes, sir.

Q. Will you please describe in general the operation of your barker now? * * * [220]

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The Witness: Yes, sir, but if you get a center of the tool holder here—center—actually—that seems to be approximately 10¾ inches.

Mr. Bailey: Draw it, please.

The Court: He testified that. He hasn't marked it on there yet.

Mr. Bailey: No, your Honor.

The Court: You wanted him to mark it on it. He's already testified. All you want him to do is remeasure it. I remember his testimony on it. That's the reason I said you were right.

The Witness: Center of this thing.

Q. Mr. Mullis, I have asked you to mark the drawing primarily because you though there might be a distortion in the picture. I call your attention to the picture, Plaintiff's Exhibit 7-BB and call your attention to the arrow in the upper right margin of that picture, which [222] indicates the upper side of the picture. Would you say that the picture is the right side up for that arrow, pointing upward? A. Yes, sir, you can see the houses through it.

Q. All right now. I call your attention to the arm which is in the middle of the picture towards the bottom which is almost an edge view of the arm. Is that correct? A. Yes, sir.

Q. Can you identify the pivot location between the arm and the ring in that picture, or does it show? A. It doesn't show. It would come down to about there.

Q. Now, as you look at that picture and that particular arm and compare it with the drawing, Plaintiff's Exhibit 12-D, does it look to you now like that arm is distorted or does it appear in its true edged shape as far as you 96A can tell? A. I think there's some distortion there. I don't know just what it is. I mean, the distance is —seems to be a good bit further from here to there.

Q. That's not the arm to which I refer, Mr. Mullis. I refer you to the arm at the bottom. A. But you can't see down here; you can see up there.

Mr. Bailey: The witness was pointing . . .

Mr. Beach: To the upper right arm.

Mr. Bailey: . . . saying, "Down here," he was pointing to the lower right arm and, "Up here," to [223] the upper right arm.

The Court: The Court will take judicial notice as far as distances are concerned, you can't measure distances on a photograph or even estimate. I don't think that's worth anything.

Mr. Beach: I think that the point that we are getting at, your Honor, was that Mr. Mullis had testified that according to his . . .

The Court: Well, it might be as far as—in other words, photographs, as far as measurements are concerned and things of that kind, I don't take photographs for that.

Mr. Beach: Yes. Well, I think that we were trying to get his testimony to the . . .

The Court: I understand. He said the photograph appeared like there was some distortion there. That's possible.

Mr. Beach: We wanted to establish that the pivot on the arm, between the connecting rod or piston rod and the arm was closer to the arm pivot on the ring than it was to the edge of the tool engaging the log.

The Court: You have got your measurements there. I don't go for measurements on photographs. As far as photographs are concerned, they can be distorted too. I have tried so many of these personal injury cases on the [224] highway and they bring a photograph up there and each side has a photograph of the same thing and it looks different.

97A Q. Now, Mr. Mullis, I ask you if you would explain generally now how this debarking machine of yours operates in barking a log? A. Well, the log is kicked onto the rollers from the opposite side of this photograph as it is shown here; the rollers bring the log in; in the meantime, the center section is lowered by hydraulic means to where the center of the ring or reel is exactly in the center of the log. Regardless of the size of the log, these arms automatically open to receive the log, whether the log is three inches or in the case of this machine, thirty-six inches, as it was a thirty-six-inch log. Nothing is required of the operator except centering the ring around the log. The opening of the tools are automatic. Due to the shape of the tools, the askew-shaped arms accomplished the opening of the tools. Then, the tools are under pressure. They are under continuous pressure: one pressure only, determined by the conditions whether it's winter or summer; if it's winter, you have to put more air in the tank. We have a circular, doughnut-shaped tank that all this reel mechanism is attached to and from that circular tank or in that circular tank, in the inner periphery of the tank, we have four holes cut [225] through which a sleeve is inserted into the tank and in this sleeve is cylinder walls for the piston. The piston is attached to the piston rod at one end—to the piston rod at one end and the piston rod is attached to the arm at the other end of the piston rod. A continuous pressure is exerted at all times on these tools. The only time that you—this is an improvement over anything that had been offered before in ring types that we knew of under air pressure. Air pressure is—or fluid under pressure with air or gas as the exependable part or the part that can be—that is elastic—give you elastic pressure—but then this log is fed on through, it is debarked as it goes through. You can feed it slow or you can feed it fast. The ring is turning at any desired speed. In this machine of ours, we have held to turning the log—turning the machine faster.

Q. Mr. Mullis, I'm sorry to interrupt you and you have given the description of various features of the machine. What I asked you was if you would describe how the
98A log would be debarked by the barker. Now, what I would like to do is to have you give—try to give the judge a picture as to just what happens, what the operator does and what the machine does during the barking of a log? I didn't ask you about the construction features. A. I can show you that better by a brochure because a picture

like this does not show any of the component parts [226] of the outside of this ring.

Q. I don't think we need to show the component parts. Just explain what the operator—how the operator would manipulate the log and the parts of the machine and what they do.

The Court: I doubt if he could do that from that picture. If he has something else he could do it better, I think he should be permitted to do so.

Mr. Beach: Perfectly all right, your Honor.

The Court: Is that one in evidence? Exhibit . . .

The Witness: 13-A.

The Court: All right. Go ahead.

The Witness: This Exhibit 13-A is a picture of the machine as it was set up to take a picture of, shows the control—all the controls on the machine. It also shows everything that could be seen on the outside.

The Court: Let me ask you one question there. I have been noticing on all these drawings—do you see what I am pointing to? What is the use of that? Is that to come down to hold the log . . .

The Witness: Yes, sir. That's a concave roller which is under hydraulic pressure.

The Court: And that helps roll the log?

The Witness: That is powered. It's a powered roller.

[227]

The Court: I have seen it in all the drawings and I didn't know exactly what that was.

The Witness: It is synchronized with the roller below, absolutely correctly synchronized, and the log is held
99A on the upper side of the log by this roller. As the log approaches . .

The Court: What counsel wants you to do now is put the log on the rollers and show how it operates.

The Witness: The log is placed on the roller and it goes in until it approaches the machine. These rollers, of course, are not always furnished by us but we prefer to.

As it approaches the machine, the operator lowers the hold-down roller to where he's got pressure on the log from bottom and top. These logs are—I mean, these rollers are powered both the top rollers and the bottom rollers are powered with a variable speed motor and the operator has it under his control to stop, start or speed up or slow down this log. But he brings the roller down on it and puts pressure on the log which holds the log. Immediately, he adjusts this center section up to where the center of the log approaching is in the center of the ring that it's going through. Then, the log is automatically—automatically lifts the arms; the arms spin over the end of the log or ride over the end of the log to get on top of the log. Then, these arms are under pressure, air pressure [228] in a doughnut shaped tank that we operate with about 60 pounds of air and it transmits pressure to the debarking arms and tools by means of a piston in a chamber in the doughnut-shaped tank. I've got—in the center of the—this exhibit, page . . .

Q. Plaintiff's Exhibit 13-A. A. The center of log—I don't believe we've got a page, center of the brochure on the right-hand corner, under point Number 6, shows a drawing which is not to scale or anything but shows this drawing with the pistons, the connecting rod, the arm and the way they are attached together.

Q. Mr. Mullis, I'm sorry to interrupt you, but these details of construction are shown in the drawing which we have referred to earlier . . . A. Yes, sir.

Q. And what I am interested in and what I asked you was to explain the operation. Now, maybe I had better go through it and you correct me. How would that be? So that we can see if we can give the judge a picture.

100A The Court: Well, he started out to explain it.

Mr. Beach: Yes, he did, your Honor, and he got off the track.

(Off the record.)

The Court: He started out to detail the operation and then after detailing the operation for a while [229] he detoured it a little bit to explain that picture in the middle there. Now, take up from where—I don't want to go all over that again because you've already got the log in there and already got these skinners on top of it by the pressure. Now, from then on, what does it do?

The Witness: Well, these tools are rotating clockwise around the log and as the log is fed on through, the bark is removed. It comes on to the back hold-down rollers and they are adjusted on the log to hold the log. You cannot see them from here but they are behind the ring. This is the center section. This is the hydraulic stuff that raises and lowers the center section. The log feeds on through and it is debarked.

The Court: What part do you think he left out, Mr. Beach?

Mr. Beach: Maybe your Honor understands the operation from what the witness has said. What he didn't say was—and I think the witness could correct me—when the operator first starts the machine, first thing he does is to start the rolls in operation so that they are turning, the lower rolls and the upper rolls. Also, he starts the tools, tool arms turning by rotation of the ring, so that all parts of the machine are moving. Is that correct, Mr. Mullis? A. That is correct. [230]

Q. Then he throws a log onto the rollers from a log storage of some type and the log starts to come towards the machine and engages the tool or the tool arm as the witness has explained but I think an important point is that he doesn't get the log into the machine before he starts the operation of the rotating ring. The ring is rotating before he starts the machine.

101A The Court: That's correct, isn't it?

The Witness: Yes, sir.

The Court: I understand that.

Q. Then, I wanted to ask the witness about this picture, Plaintiff's Exhibit 7-AA. This picture shows the tool engaging the log and obviously the log is stationary. This type of operation would not occur in the normal debarking operation, would it, Mr. Mullis? A. No, sir, the tools are digging in there, it looks like.

Q. And the log is stopped and the ring is stopped? A. Yes.

Q. This would not occur in a normal operation because all these parts would be moving before the log gets into that position and they would all continue to move until after the log is completely free of the ring? Is that correct? A. That's correct.

Q. Can you explain, now, why the tools would dig in [231] in a case like that, which would not be a normal operation as shown in this photograph? A. Well, these tools would dig in because you've got a pressure that's equal to possibly a thousand pounds per square inch of surface on the tools and it goes around and around in the same path.

Q. In other words, the forward feed of the log is stopped—trying to expedite this . . . A. That's right.

The Court: Some witness already testified and explained why that was done.

Mr. Beach: Yes, that was Mr. Holekamp that took the pictures. I just wanted to verify it with Mr. Mullis.

The Court: In other words, he said what caused that was that it was stopped.

Mr. Beach: Yes.

The Court: In other words, the movement of the log was stopped going forward and it kept—would keep digging a hole. I understand that.

162A Mr. Beach: I see. I just wanted to verify it with this witness.

The Court: That's correct, isn't it?

The Witness: That's correct, yes.

The Court: Anything further from this witness? [232]

(Discussion as to motion pictures of machines.)

The Court: I don't care about seeing moving pictures, especially if we are going to see the machine. Have you had some made?

Mr. Beach: No, we have not.

Mr. Bailey: Might I suggest if Mr. Beach is agreeable that counsel on both sides agree that if this case goes on appeal and if either side wishes to take motion pictures of one of these machines, it may do so?

The Court: Is that agreeable?

Mr. Beach: Yes, that is agreeable, your Honor.

The Court: In other words, it's agreeable to add that to the record?

Mr. Beach: There are two things on that: It is, of course, very helpful to see the machine in operation.

The Court: I am going to do that, go down there tomorrow to do that.

Mr. Beach: Yes.

The Court: As far as the Lancaster one is concerned and if I think it is necessary at a later date, I will go and look at one of your machines.

Mr. Beach: Fine, your Honor. It is a little difficult, your Honor, to see just what happens even when you are actually seeing a machine because of the speed with which [233] the ring rotates around the log. If slow motion pictures could be taken, this might be helpful even to your Honor.

The Court: You can do it if you want to, but I'll tell you the truth. I think I understand this case pretty well already, both sides of it. I still repeat, I don't see there's much—I don't think there is much controversy about
103A the facts. It's the conclusion to be drawn therefrom
that's going to bother me. I think I pretty well know what the facts are already.

Mr. Beach: Just in case it should be necessary to take motion pictures, I wanted to ask the witness whether there is still, as far as he knows, an installation of one of his barkers at Klamath Falls, Oregon, and at Sweet Home, Oregon? A. There is.

Q. They are both still in operation? A. Yes.

Q. And if it should be desirable to take pictures of those installations, arrangements could be made so that pictures could be taken there? Is that correct? A. I feel certain that arrangements could be made.

THE COURT: What?

THE WITNESS: I feel certain arrangements could be made. I might state that the 36-inch machine at Sweet Home is . . . [234]

THE COURT: What's the objection—I think it would be better to take moving pictures of the machine I look at instead of one that—I believe it would be better.

(Off the record.)

MR. BEACH: That's the point, your Honor, I was thinking of the matter of convenience.

THE COURT: I think it would be better to take the one down here that I look at.

MR. BEACH: All right, your Honor.

THE COURT: What do you think about it?

MR. BAILEY: I was going to say, your Honor, we will—as far as we are concerned, we will do anything to accommodate Mr. Beach. We can't absolutely control our customers, naturally, but . . .

THE COURT: All you would have to have was one of your men—you wouldn't have to be there to have motion pictures made of it, I wouldn't think. You can tell them what to do.

(Off the record.)

MR. BEACH: In any event, we have established that these machines will be available if that should be necessary.

104A Q. (By Mr. Beach) Mr. Mullis, you stated, I believe, that your barker at your mill would handle logs from—was it four inches in diameter up to thirty-six inches in diameter? [235] A. Four or five inches. Five probably would be—with the tool setting, you can come down to anything you want but it might not go up to 36 because if you had the—we could go from five to thirty-six without changing the tool settings.

Q. Can you tell me approximately what would be an average range of sizes of logs which you customarily bark in your plant? A. Ours are very small, nine, ten, twelve-inch diameter. We have a few large logs but they are relatively small even for the industry and the industry out here has smaller logs than they do on the West Coast.

Q. So that the average would probably be nine to twelve inches with probably 90 per cent of your logs within that range? A. Yes, sir.

Mr. Beach: That's all, Mr. Mullis.

Mr. Bailey: I have no cross-examination. * * * [236]

* * * * * * * * * * *

Mr. Bailey: I will admit the log goes through; I will admit that the tool, in effect, follows a spiral path around the log, if that's what you want, Mr. Beach. * * * [241]

* * * * * * * * * * *

181A Thomas W. Nicholson, recalled, testified as follows:

Direct Examination

By Mr. Bailey:

Q. You have recently sold a number of machines of a type different from what is shown in your two patents that are here in suit, Plaintiff's Exhibits 1 and 2, and which are identified as "Accumat RotoBarkers," have not you? A. In what respect were they different?

Q. You have identified certain machines which you have sold as Accumat RotoBarkers, have you not? A. Yes.

Q. And you have only done that for a few years? Is that correct? A. Correct.

182A Q. When did you build the first barker which you called "Accumat"? A. I believe 1957.

Q. And you sold one of those machines to the Crosby Lumber Company of Crosby, Mississippi, did you not? A. Yes.

Q. I hand you a four-page item, entitled, "Specifications —34" Nicholson 'Accumat' Roto Barker," and ask you if that was put out by your company? [375] A. I don't know.

Q. Is it specifications of a RotoBarker put out by your company? A. It could be. I would have to study it to make sure

Q. Well, now, that was produced at the time of your deposition in Washington, Mr. Nicholson. Wasn't what you produced there the specifications? A. Yes, they were. If this is it, then that's . . .

Q. I assure you to the best of my knowledge this is . . . A. I didn't know that was the one.

Q. It's marked, "Plaintiff's Exhibit Number 10" from your Washington deposition. A. I didn't see that.

Mr. Bailey: I offer the specifications.

(Specifications, "Accumat" Roto Barker received into evidence as Defendant's Exhibit 11.)

Q. I show you two photographs and ask if those are photographs of a machine made by you and sold under the name "Accumat"? A. Yes.

Q. As I recall, you said these were not necessarily the Crosby machine, but they were typical of it? A. Yes, sir.

[376]

Mr. Bailey: I ask that the photographs be marked as Defendant's Exhibits 12-A and 12-B.

(Photos, Accumat, received into evidence as Defendant's Exhibits 12-A and 12-B.)

Mr. Bailey: Your Honor, on the drawings I am going to produce now, we ask permission to withdraw them to have copies made.

183A The Court: All right.

Q. I hand you a print of the drawing entitled G-50AC-11096, dated June 30, 1960, and ask you if that drawing represents the construction of your Accumat machines? A. Yes, it does.

Q. I hand you another drawing identified as "E34AC-3618" and ask you if that represents the construction of parts of your Accumat machines? A. I believe it does.

Mr. Bailey: I ask that the two drawings be offered in evidence as Defendant's Exhibits 13-A and 13-B.

(Drawings, G-50AC-11096 and E34AC-3618, received into evidence as Defendant's Exhibits 13-A and 13-B respectively.)

Q. Mr. Nicholson, this machine as shown in Exhibit 13-A is a ring-type debarker, is it not? [377] A. Yes, it is.

Q. I am going to ask you if this is the ring? A. Yes.

Q. I will mark that with an "R" in red. And the machine has inwardly directed arms, does it not? A. Yes.

Q. And is this one of the arms? A. Yes.

Q. I will mark that with an "A." And is that pivoted on the ring at this point? A. Yes.

Q. I will mark that "AP". Is there at this point a cylinder? A. Yes.

Q. A fluid pressure cylinder? A. Yes.

Q. I will mark that "C." And is that pivoted to the arm at this point? A. Yes.

Q. That is a piston sliding in that . . . A. Rather, it is pivoted—it is pivoted at this . . .

Q. Perhaps that other drawing will help us out on that. A. No, it's pivoted at that point, yes. I am pretty sure it is.

Q. That is the piston rod that slides . . . [378]

The Court: You can bring that up here if you think it will be better.

184A Mr. Bailey: Thank you, your Honor.

(Witness and counsel approach the bench.)

Q. The rod of the piston slides in that cylinder, is pivoted to the arm at this point, is it? A. Yes.

Q. We will mark that "PRP," piston rod pivot. On the inner end of that arm, there is a debarking tool, is there not? A. Yes.

Q. Mark that "T." Now, the whole ring is rotating in this direction, is it not? A. Yes.

Q. I will mark an arrow there to indicate that. Now, there are shown here four oval-shaped pieces. What are those? A. They are what we term hydraulic accumulators.

Q. I will mark that "ACC." Now, is it my understanding that within that accumulator there is a bag that separates the interior of it into two sections? A. Yes.

Q. Would it be proper to show the bag something like that? A. Yes, I could draw it.

Q. Draw it for me, please, in red.

(Witness draws.)

Q. I am going to mark that bag with a "B." That is a flexible bag? [379] A. It is a rubber bag.

Q. And inside that bag is nitrogen under pressure? Is that correct? A. Yes.

Q. And outside of that bag is a hydraulic fluid such as oil? Is that correct? A. Yes.

Q. And that hydraulic fluid from the outside of the bag passes through a pipe here? Is that correct? A. Yes.

Q. Which we will call small "p"? A. Yes.

Q. To the cylinder "C"? Is that right? A. Yes.

Q. So that pressure of the gas in the bag "B" is transmitted through the hydraulic fluid and the small pipe "p" to the interior of the cylinder "C" and tends to push the piston rod to the left and thereby to push the arm inwardly and to hold the tool against the log? Is that correct? A. That's correct. The air pressure in the bag and the hydraulic pressure are the same

185A Q. Referring to Exhibit 12-B, I see a small pipe here, which I am going to mark small "p" in the margin. As I understand it, that pipe connects all four of the accumulators? Is that correct? A. That is correct. [380]

Q. That is, it connects the—it runs around the ring and connects the oil chambers of all four of the accumulators A. That's correct.

Q. Now the arms—if we look at Exhibit 12-B, is this the arm here? A. Yes.

Q. I am going to mark that "A" then. And the arm pivot is here, is it? A. Yes.

Q. I will mark that "AP." Now this figure is really reversed from Exhibit 13-A, is it not? In other words, in figure—in Exhibit 12-A is a view from the opposite side, is it not? A. No, this is both.

Q. I see. I beg your pardon. A. From the same side. They both go the same direction. Excuse me. They do not. One turns—these two rings turn different directions. These are different size machines.

Q. The ring here rotates in the direction of this red arrow which I have drawn? Is that correct? A. That's correct.

Mr. Bailey: I was just trying to bring out, your Honor, that this would be looking at it from opposite sides. Now, on that ring, on that arm I see an up-standing ridge, sort of, which seems to increase in height from a [381] point near the tip of the arm down to a point towards the base of the arm. Is that correct? A. Yes.

Q. I am going to mark that "F."

Now, is Exhibit 12-B a view of the incoming side? A. Infeed, yes.

Q. Infeed side. Now, in this device of yours, isn't it true that in operation, when a log is fed in by the feed works, and it meets this flange "F" on the arm, and the ring rotates, that flange "F" engages the butt face of the log and causes the arm to open up against the pressure of the air in the bag "B" or the nitrogen, compressing 186A that nitrogen until the arm opens up enough for the log to move in between, whereupon that pressure clamps the tools back down on the log? Is that correct? A. Yes, we built two versions of the machine: one version that we can relax the tools prior to the entrance of the log, even though the ring is turning. We do that at this time. Not true at the time of the deposition.

Q. Well, now, I am still speaking of the machine shown in this photograph. That machine has a self-contained reservoir of air carried by the ring, does it not, or gas or fluid pressure? A. It has no reservoir if you regard a reservoir as something we take from.

Q. Well, now let me put it this way then: there is no [382] outside source of fluid pressure when the ring is rotating, is there? A. No.

Q. All the fluid pressure comes from storage in these bags, does it not? A. Yes.

Q. And they are completely carried by the ring and turn with it? A. Yes.

Q. You may have to refill them from time to time. I realize that. A. Well . . .

Q. That's true, isn't it, you might have to occasionally, at least, depending on how tight your joints are? A. Yes.

Q. And you might have to put some oil in here occasionally, may you not? A. Yes.

Q. But that's when you are shut down and not operating, isn't it? A. Yes, not running the barker.

Q. So that when this barker is operating, as the logs approach it, the arms open automatically? Is that correct? A. Yes. [383]

Q. Put the tools down on the log—is that correct? A. Yes.

Q. And the pressure in the various bags is equalized, is it not, by interconnection of all of the accumulators
187A to each other? A. If it is a normal log, which is rough and uneven, the answer is "No." If it is a straight cylinder-type log, the answer would be "Yes."

Q. Well, now, Mr. Nicholson, if there's an increase in pressure in this bag—I mean, if there is an increase in that pressure on one of the arms such as this arm, that will cause a backflow of fluid presumably through the small pipe "p" and into the accumulator, would it not? A. Yes.

Q. That accumulator is connected with this accumulator, is it not? A. Yes.

Q. And with the next one? A. Yes.

Q. Won't those pressures—well, I mean subject to possible temporary variations—but won't they normally be maintained equal in all the accumulators by the interconnection of the tanks? A. Depends on what's normal. Log barker—I'm not trying [384] to be evasive but a log barker—logs are rough, uneven, crooked and the interconnection is not sufficiently large to allow for the almost instantaneous transmittal of fluid which would be necessary to maintain uniform pressure.

Q. But let's assume that you had some leakage in one of these—from one of these bags . . .

The Court: I think he answered your question. He said it depends altogether on the kind of logs he uses whether or not they would be equal.

Mr. Bailey: Your Honor, I'm trying to show one more point.

The Court: I could see how that would be.

Q. If you had some leakage from one of these bags, so that the pressure in that became somewhat smaller, wouldn't this interconnection produce equalization of the pressure in all of the bags after a very short time? A. That's the purpose of it.

Q. Yes. When did you first design a barker of the type shown in Exhibit 13-A—you or your company? A.
188A I believe it was the first part of 1957.

Q. At that time had you ever seen one of the Mullis debarkers? A. Yes. Yes, I had from a distance.

Q. Had you ever had any description of how to operate it given to you? [385] A. We had a rough description.

Q. Had you, before you saw the Mullis machine, even seen any other log-debarking machine which had a self-contained source of fluid pressure and which had automatically opening arms operated by the incoming log and which had equalization of the fluid pressure to all the arms? A. No, I don't believe so.

Mr. Bailey: That's all I have, your Honor.

Cross Examination

By Mr. Beach:

Q. Mr. Nicholson, you were asked regarding whether you had seen a Mullis barker at the time that the barker about which you have been interrogated was designed. I would like to ask you whether or not you designed this so-called "Accumat" barker? A. No, I didn't.

Q. Who did design it? A. Mr. Peter Nelson, an engineer with our Canadian company.

Q. Where is that located? A. Victoria, British Columbia.

Mr. Beach: That's all. [386]

Samuel W. Ellis, recalled, testified as follows:

Direct Examination

By Mr. Bailey:

Q. Mr. Ellis, you heard the testimony of Mr. Nicholson, have you not? A. Yes.

Q. And you have seen the exhibits which have been introduced in evidence here in connection with the Accumat machine? A. Prints, yes.

189A Q. Which I now hand you; that is, Defendant's Exhibit 11, 12-A, 12-B, 13-A and 13-B. Is that correct? A. 11, 12-A, 12-B, 13-B.

Q. 13-A and 13-B? A. Should be 13-A and 13-B—yes.

Q. And you have seen the Mullis patent 2,908,302, Defendant's Exhibit 1, have you not? A. Yes.

Q. Have you studied that patent? A. Yes.

Q. I am going to call your attention—first, I hand you a sketch which I had you to prepare and ask you if that represents to the best of your understanding the construction of the Nicholson Accumat machine insofar as the mounting of the arms and supply of pressure to them is concerned? [387] A. This was traced from a Nicholson drawing or patent—this drawing here, traced from that drawing . . .

Q. Exhibit 13-A? A. Exhibit 13-A. This had the—this is traced from this area right here.

Q. Near the bottom of the drawing? A. Near the bottom of the drawing except for the part labeled "Nitrogen pressure bag." That is put in there on supposition.

Q. That supposition was based, however, was it not, on reading the Nicholson deposition? A. Yes.

Q. Is it in agreement with what you heard Mr. Nicholson testify here? A. It is in agreement with what is shown in red on this drawing.

Q. And these various legends that you have applied here are in agreement with what you have understood from the drawing and from the—Mr. Nicholson's testimony? A. That is right.

Q. And is this, what is called, "Hydraulic supply pipe around ring," that is not shown in the drawing here, is it?
A. That is not shown in this drawing. Segments are
shown in another drawing and the pipe is shown in
190A this photograph except that it has what I would call
"expansion bends" which I do not indicate. [388]

Q. That is in Exhibit 12-B? A. Yes.

Mr. Bailey: I ask that that drawing be marked for identification as Defendant's Exhibit 14.

(Pencil tracing and drawing, showing hydraulic system of Accumat marked for identification as Defendant's Exhibit 14.)

Mr. Beach: We would like an opportunity to take a look at it. Counsel can proceed with the examination.

The Court: Look at it now. Let him look at it now.

Mr. Beach: He is not going to question about it.

Mr. Bailey: I may need it.

The Court: I am giving you time to look at it now. If you want further time to study it, I will give you a longer time.

Mr. Beach: We would have no objection, your Honor.

The Court: All right.

Mr. Bailey: I offer it as Defendant's Exhibit 14, your Honor.

(Defendant's Exhibit 14 for identification received into evidence as Defendant's Exhibit 14.) [389]

Q. In the Accumat machine, do you find that that is a machine for the purpose of skimming logs? A. Yes.

Q. What is the principal movable part of the machine? A. The principle movable part, you may refer to the ring which rotates or to the arms which move out.

Q. There is a ring which rotates? A. Yes.

Q. And being a ring, it has a central passage, does it not? A. Yes.

Q. What is the purpose of that central passage? A. To permit the log to pass through and for the debarking tools to engage the log for the purpose of taking the bark off.

Q. Now, how are the arms which you have spoken
191A of mounted? A. Mounted on a pivot, which is supported on the ring.

Q. And what is their movement? A. The movement is to swing out from the center of the ring toward the—what you might call the ring housing, or the ring itself, to move out of the way of the log. They swing out.

Q. Is that the only direction in which they swing? A. Well, they rotate with the ring.

Q. Well, I mean how do they engage the—how do they — [390] don't they also swing in to cause the tools to engage the log? A. Of course, they are under pressure, tending to push them in but the log pushes them out and until they reach the circumference of the periphery of the log—in which case they don't swing out any further.

Q. Suppose the log tapered downwardly as you went along. A. It would follow the log down.

Q. They would move inwardly? A. They would move inwardly. That's right.

Q. Do you find anything for removing bark carried by the arms? A. I would believe that these tools here, these ends, are for the purpose of removing bark from the logs.

Q. What provides the pressure for holding those tools against the logs? A. The hydraulic or the—the hydraulic pressure in the cylinders which is maintained at an operating pressure by the bag, the nitrogen-filled bag, which is encased in the hydraulic accumulator.

Q. And what is the effect of the interconnection of the different accumulators? A. The interconnection tends to provide equalization between the—equalization among the four accumulators.

Q. And what is the general result of that as far as the [391] pressure on the arms is concerned? A. It would tend to equalize the pressure on the arms. 192A

Q. On all four arms simultaneously? A. Simultaneously . . .

Q. I don't mean equalize simultaneously but it would tend to main.. simultaneous equal pressure on all four arms? A. Yes, tend to do that.

Q. What carries the source of supply of fluid pressure? A. I would like to understand the question a little better, please, sir?

Q. Well, now, what provides the fluid pressure in the first place?

The Court: The fluid, I would think.

Mr. Bailey: The fluid.

The Witness: The fluid pressure, of course, we are working with two fluids . . .

Q. Now, is the source of fluid pressure carried by the ring? A. It is, in the—the source of the pressure is in the nitrogen-filled bag.

Mr. Bailey: I have no more examination.

The Court: Cross-examination.

Cross Examination

By Mr. Beach:

Q. Mr. Ellis, did you ever see a Nicholson Accumat [392] Barking Machine? A. No.

Q. The information which you have given here as a witness, you have obtained solely from the drawings and photographs that counsel has supplied to you? Is that correct? A. Yes.

Q. And the description, perhaps? A. Yes.

Mr. Beach: That's all.

The Court: Next witness.

Mr. Bailey: No further evidence, your Honor. * * * [393]

* * * * * * * * *

193A **Mr. Beach**: I would like to offer in evidence on behalf of the plaintiff, as defense of the counterclaim, the file history of the Mullis patent, Number 2,908,302, marked for identification as Plaintiff's Exhibit 19-A.

(Above-described file history received into evidence as Plaintiff's Exhibit 19-A.)

Mr. Beach: In conjunction with that exhibit, the patents to which the Patent Office referred during the prosecution of the application, the League Patent, 2,749,952, as Plaintiff's Exhibit 19-B. The Brundell et al patent, Number 2,786,499, as Plaintiff's Exhibit 19-C. The Hansel [394] patent, Number 2,798,519, as Plaintiff's Exhibit 19-D. The Nicholson patent, Number 2,821,220, Plaintiff's Exhibit 19-E. The Swedish patent, Number 67,469, Plaintiff's Exhibit 19-F. A translation of that Swedish patent, as Exhibit 19-G.

(The above described documents received into evidence as Plaintiff's Exhibits 19-B through 19-G, inclusive.)

The Court: That is upon the validity of the defendant's patent?

Mr. Beach: This is the file of the defendant's patent, your Honor.

The Court: This is the file.

Mr. Beach: It is the file.

The Court: It's offered for what purpose?

Mr. Beach: Offered for the purpose of interpreting the claims on the question of infringement.

The Court: I see what you mean.

Mr. Beach: There was also cited in the file Whitlock patent Number 2,591,751, which is one of the defendant's exhibits here so there's no point in duplicating that in the record.

Also, Nicholson patent, Number 2,802,495, was cited against this application and that is in the record. [395]

In addition to that, we would like to submit as prior art patents, Emery patent, Number 2,477,922, marked
194A for identification as Plaintiff's Exhibit 20-A. Andersson patent, 2,623,558, Plaintiff's Exhibit 20-B. Leffler patent, Number 2,692,623, as Plaintiff's Exhibit 20-C. And a Canadian patent of Piispanen, Number 489,540 as Plaintiff's Exhibit 20-D.

We offer those in evidence as the respective exhibits of those numbers.

(The above-described documents received into evidence as Plaintiff's Exhibits 20-A through 20-D, inclusive.)

Mr. Beach: That's all.

Mr. Bailey: I would like to offer in evidence at this time as Defendant's Exhibit 10 a copy of the sketch which was made on the blackboard.

The Court: All right.

(Sketch received into evidence as Defendant's Exhibit 10).

Mr. Beach: That will be all of the plaintiff's defense to the counterclaim, your Honor.

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199A IN THE UNITED STATES DISTRICT COURT FOR
THE WESTERN DISTRICT OF SOUTH CAROLINA
ROCK HILL DIVISION

CA/2613

THOMAS W. NICHOLSON, *Plaintiff*,

vs.

CARL W. MULLIS ENGINEERING AND MANUFACTURING
COMPANY, INC., *Defendant*.

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Findings of Fact

200A 1. Plaintiff is a resident of Auburn, Washington.

2. Defendant is a corporation of South Carolina, located at Lancaster, South Carolina.

3. This is an action under the patent laws of the United States.

• • • • • • • • • •

201A 11. Mullis has charged Nicholson with infringement of claim 8 of his patent No. 2,908,302 by making and selling a debarking machine known as an Accumat.

The Nicholson Accumat machine is not like the one shown in Nicholson's 495 and 496 patents.

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13. Plaintiff attacks the validity of the Mullis patent and denies infringement.

• • • • • • • • • •

207A

THE MULLIS PATENT VALIDITY

52. The machine of the Mullis patent is designed to remove the bark from logs. In general, it comprises a rotating ring or drum (Fig. 5) turning about a horizontal axis and having inward extending pivoted arms 216 having tools 224 on their tips for removing the bark. The logs are fed through the ring by feed rollers. (see Fig. 2).

In this machine, the arms are of triangular shape (see 216, Fig. 6) with a reinforcing flange D along one edge consisting of an arch-shaped plate of substantial thickness and rigidity welded along one side of the triangle. The arms are curved inwardly toward the axis of the drum. These arms are hinged at 212 on the inside of the hollow rotating ring. Pistons are movable in cylinders 232 opening into the ring, and are connected by piston rods 252 to the arms. The outer ends 246′ of these cylinders are completely open in communication with the ring tank 104 and such cylinders are mounted on the inner peripheral wall 106 of such ring tank.

208A A valve allows the operator, while the machine is stationary, to supply compressed air to the inside of the hollow ring. This causes a pressure on the pistons which pushes them against the log as it passes through the ring.

The debarking tools are mounted in slots in the ends of the arms.

The arms are made somewhat askew, that is, they are not simply plain flat sheets radial to the axis of rotation of the ring but are somewhat twisted into a slightly spiral or helical shape. The curvature of the arms and the reinforcing flange gives the inside edge of the flange a curved shape. This curve approaches the center of the drum. As a result, when the front corner of a log is fed against these arms, as the drum is rotating, the inner edge portions of the flanges engage over the corners of the end of the log and, as the log is pushed farther into the ring, are cammed away from the axis so that the tools are moved out of the path of the log. As soon as the front end of the log reaches the center of the drum, its edges have passed the edge portions of the arms and the tools drop down on the log and are pressed against it by the air pressure in drum R. Continued movement of the log combined with rotation of the head or drum then causes the tools to follow a spiral path around the log to remove the bark.

53. In past log debarking machines, there had been none which accomplished simultaneously all the advantages of this Mullis machine. The Mullis machine, because all the outer ends of cylinders 232 open into the ring tank 104 common to them, the pistons are not pushed against the log with different pressures (as they are if individual springs or rubber bands are used for each tool arm). Likewise, there is no need in Mullis for a seal between the rotating ring and a stationary frame, since the source of pressure in Mullis is self-contained in the ring and only requires replenishment once or twice a day. Also, the arms of Mullis are askew, that is, they have an edge of gradually tapering nature facing the oncoming log, which engages
209A the butt end of the log and, by the rotation of the ring around log, causes the arms to open up and admit the log, after which the tools engage the periphery o fthe log to debark it. This askew arm feature means that there is no need for any control connection between the rotating ring and a stationary control lever available to the operator.

54. As is shown by the Nicholson 495 patent, the supply of fluid under pressure to the log from an outside source, along with the control of this fluid so as to produce opening and closing of the arms to admit the log and then to clamp the tools against it, requires a fairly complex sealing mechanism shown at the bottom of Fig. 3 (sheet 3) of the drawings of the 495 patent.

The expense of this construction is eliminated by the Mullis construction.

55. Emery 2,477,922 has a ring adapted to be fed along and to rotate around a tree or log. This ring carries two unconnected tanks 75 for pressure fluid. The debarking elements of Emery are mounted on arms pivoted about axes perpendicular to the log axis, and are located completely outside the ring. The arms which carry the tools are not self-opening.

56. The tool carrying arms of Whitlock are opened by admission of air under pressure to cylinders 134 and are not self-opening.

57. Andersson 2,623,558 furnishes air to cylinders 3 from a source outside the ring. He has no pivoted arms. The debarking tools are moved outwardly by air pressure and are not self-opening.

58. Leffler 2,692,623 has a separate spring and weight for each arm, and there is no interconnection for purposes of equalization. The arms are not opened by engagement with the butt end of the log.

59. League 2,749,952 moves the debarking tools in and
out by turning one ring relative to another to shaft
210A the pivots of cylinders 42. These cylinders are
merely cushioning members (col. 4, lines 63-69).

60. Brundell 2,786,499 has self-opening arms. Brundell applies the force to the arms by a separate rubber band or the like for each arm. There is no interconnection between the arms.

61. Hansel 2,798, 518 has no self-opening arms. Movement of the arms is controlled by fluid under pressure supplied to cylinder 19 in which slides a piston 20 rotating with the ring.

62. Piispanen (Canadian) 489,540 shows in Fig. 1 a chain 38 carried by arms 39 mounted to turn about an axis perpendicular to the log axis and completely outside the ring.

63. Piispanen supplies fluid under pressure to the pistons from a stationary source and requires a seal between the rotating ring 27 and the stationary frame 21. All the cylinders of Piispanen are interconnected.

64. Piispanen shows in Fig. 3 similarly mounted arms with flexible metallic straps as debarking tools each pushed by a separate spring for each arm, but which springs are connected to the pressure equalizing ring 72 in common.

INFRINGEMENT

65. Nicholson has, since the issuance of the Mullis patent, built and sold within the United States such a log debarking machine called an Accumat.

66. The Accumat machine is a rotating ring type debarker with inwardly directed arms pivoted on the ring. Cylinders mounted on the ring have pistons slidable in them and pivoted to the arms. There are four such cylinders. There is a so-called accumulator for each cylinder. This is a tank with a bag inside it containing a gas under pressure. Hydraulic fluid in the tank on the outside of the bag is connected by a pipe to the cylinder, to push the arms inward and hold the tools against the log.

The supply of pressure fluid in the Accumat machine is self-contained by the ring.

211A All four of the tanks are connected by a pipe which runs around the ring. If there is leakage from any bag, this pipe will produce equalization of the pressure in all of the bags after a short time.

On the arm of the Accumat barker is an upstanding ridge which increases in height from a point near the tip of the arm toward the base of the arm. Engagement of the flange or ridge by the butt of the log causes the arms to open up automatically to admit the log between them.

67. The expense of a connection to a stationary source of fluid pressure is also eliminated in the Nicholson Accumat machine, built after Nicholson had knowledge of the Mullis machine. Nicholson's Accumat uses askew arms closely similar to the arms of Mullis and also a self-contained source of pressure fluid carried by the ring which is so connected to all the cylinders which control the arms as to produce equalization of the pressures on the different arms.

68. The Nicholson Accumat operates in the same manner as the machine shown in the Mullis patent, both as a whole and as to its individual parts, and it produces the same overall results and has substantially the same advantages.

69. Neither Nicholson nor his expert had ever before seen a machine having the features of the Mullis machine.

70. Carl W. Mullis, Sr., the inventor of defendant's ma~~chine, had~~ seen the machine of the Nicholson 495 patent before he designed defendant's machine.

Opinion and Conclusions of Law

Nicholson charge Mullis with infringement of claim 4 of the 495 patent and claim 1 of the 496 patent. Mullis charges Nicholson with infringement of claim 8 of the Mullis patent.

The machines in issue are what are known as ring-type debarkers. Such machines have a ring driven to rotate about a horizontal axis, and logs are fed endwise through the ring and are held against turning by feed rollers.
Inside the ring are mounted tools which are pressed
212A against the log and, as the ring turns, remove the
bark from the log. Such machines are not new, having been shown in the patent to Dolsen, No. 397,114 issued in 1889.

* * * * * * * * * *

216A THE MULLIS PATENT NO, 2,908,302 (2,802,496)

Mullis charges that Nicholson has infringed claim 8 of this patent by making, using and selling a machine
called "Accumat". The machine is quite different
217A from the machine shown in the Nicholson patents in
suit and was built by Nicholson after he had heard a description of the Mullis machine.

Mullis devised a machine which incorporated a number of features which Nicholson's own expert admitted he had never seen before in combination. It has a source of pressure fluid carried by the ring, so that no outside supply is needed, and there are no sealing joints required between the ring and the stationary part of the machine. The source is connected to all the cylinders so that the pressure is equalized on all the tool-carrying arms. The arms are "askew", that is, they have curved front edges so that, when the butt end of a log strikes them, they open automatically and apply the tool to the log.

No patent in the prior art and no machine known to plaintiff or his expert, has a self-contained reservoir of pressure fluid in the ring connected to all the cylinders with self-opening askew arms. This combination was new and I find the Mullis patent valid.

Nicholson adopted, with some variation, all these features of Mullis in his Accumat machine, which infringes claim 8 of the Mullis patent.

For the foregoing reasons, it is my opinion that defendant is entitled to a decree dismissing the original complaint with costs; to an injunction restraining Nicholson, Nicholson Manufacturing Company and all persons working in concert with them from manufacturing the Accumat machine or any other machine embodying the principles of the Mullis patent, and to an accounting for all Accumat machines made, used or sold after October 13, 1959, by Nicholson or Nicholson Manufacturing Company within the United States, or its territories or possessions.

Counsel may present appropriate order accordingly.

C. C. Wyche
United States District Judge

Dated:
December 8, 1961.

Judgment

221A The above entitled action came on for trial before the Court without a jury, on March 14, 1961, at Rock Hill, South Carolina, and was duly submitted for consideration and decision, and the Court, after due deliberation, rendered its decision and, on the 8th day of December, 1961, made and filed its findings of fact and conclusions of law and order for judgment.

Now, therefore, pursuant thereto, it is ordered:

1. That the original complaint is dismissed with costs to the defendant.

2. That Thomas W. Nicholson, the plaintiff, Nicholson Manufacturing Company and all persons working in concert with them are enjoined, during the life of Mullis Patent No. 2,802,496 from making, using or selling within the United States or its territorial possessions any Accumat log debarking machine or any other machine embodying the principles of the above mentioned Mullis patent.

3. Defendant, Carl W. Mullis Engineering and Manufacturing Company, Inc., and Carl W. Mullis are entitled to an accounting from Thomas W. Nicholson and Nicholson Manufacturing Company for general damages which shall be due compensation for making, using or selling the invention, not less than a reasonable royalty therefor, with costs and interest.

C. C. Wyche
United States District Judge

Dated January 12, 1962.

UNITED STATES COURT OF APPEALS
FOURTH CIRCUIT

No. 8639

THOMAS W. NICHOLSON, *Appellant*,

v.

CARL W. MULLIS ENGINEERING AND MANUFACTURING COMPANY, INC., *Appellee*.

Argued Nov. 5, 1962

Decided March 6, 1963

Robert W. Beach, Seattle, Wash. (J. Wright Horton, Greenville, S. C., on brief) for appellant.

Jennings Bailey, Jr., Washington, D. C. (Richard E. Richards, Lancaster, S. C., on brief) for appellee.

Before BOREMAN and BRYAN, Circuit Judges, and BUTZNER, District Judge.

ALBERT V. BRYAN, Circuit Judge.

Log barking machines are the subject of the three patents now before us in the review of the District Court's determinations: (1) that the two owned by plaintiff-appellant Nicholson are invalid, (2[illegible]t the one belonging to defendant-appellees Mullis is valid, and (3) that the latter has been infringed by an unpatented machine of the appellant. We sustain the District Judge in rejecting Nicholson's two patents, but we cannot join in his accordance of validity to Mullins'. Thus infringement is not reached.

The issues were made by the suit of Thomas W. Nicholson against Carl W. Mullis Engineering and Manufacturing Company, Inc., for infringement of patents 2,802,495 and 2,802,496 (known as 495 and 496). Carl W. Mullis, president of the Company, intervened to counter-claim with it (licensee) for infringement of his patent, 2,908,302, by an unpatented Nicholson product known as the Accumat.

Nicholson 495 and Mullis are aptly described in the opinion of the District Judge:

> "The machines * * * are what are known as ring-type debarkers. Such machines have a ring driven to rotate about a horizontal axis, and logs are fed endwise through the ring and are held against turning by feed rollers. Inside the ring are mounted tools which are pressed against the log and, as the ring turns, removes the bark from the log * * *".

Nicholson 496, on the other hand, is of a different design. There the barking instrument does not circumvolve the log, but rather the log is rotated while a scraper is held against it. Each of these machines, admittedly, is a combination of old elements with inventiveness asserted in its improvement. The only claims in suit are No. 4 in 495, No. 1 in 496 and No. 8 in Mullis, but none can succeed for varying reasons.

I. Nicholson 495 need not be described with greater particularity than the District Judge has done, for we invalidate the claim not upon the design or operation of the machine, but because its patentability was precluded by a disclosure antedating the protected period. Title 35 United States Code § 102(b) stipulates:

> "A person shall be entitled to a patent unless—
>
> "(a) * * *
>
> "(b) The invention was * * * described in a printed publication in this * * * country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States * * *".

Letters patent of 495 were applied for on February 1, 1954; the critical date thus is February 1, 1953, one year prior to the application.

In November 1951 Nicholson negotiated with the Cascade Lumber Company in Yakima, Washington for the construction of this barker. An agreement resulted by which Nicholson would build it at his plant in Seattle and sell it to Cascade for $30,000, the machine to be ready for testing within 150 days from November 26, 1951. Payment was to be made in installments, the final upon acceptance of the machine. If it proved unfit for the intended use and was rejected by Cascade, Nicholson would bear $5,000 of the actual construction cost and Cascade the balance, the machine then to be owned by the parties jointly.

June 13, 1952 Cascade made a progress payment of $7,500. The letter of transmittal recited the understanding that Nicholson expected to have tests of the barker made within the next 1[illegible] days and, further, that Cascade had arranged to provide a few logs for the purpose. Nicholson testified the machine was first in condition for operation in August 1952.

In September 1952, at Nicholson's instance, the barker was advertised for sale in a trade publication, The Lumberman, with a photograph and a description of the machine implying it was then operational and available. The same edition carried as a news item a full account—with pictures—of the device. On September 3, 1952 Nicholson wrote another lumber company that the barker would be installed in Cascade's mill by the end of December 1952. He noted that extensive tests had been run on all types of logs and it had done a "wonderful job".

On September 23, 1952 he demonstrated the machine to some 50 people, free of injunction of secrecy. In a letter dated September 27, 1952 Nicholson stated to a prospective customer that the first machine would be installed and in running order by the first of 1953, adding that delivery on a machine required 90 days. The latter representation he testified was in error, for delivery would have required at least 6 months. The original barker was shipped from Nicholson to Cascade in November or December 1952. In November 1952 another illustrated advertisement was placed by Nicholson in The Lumberman for sale of the machine.

He received a firm order for his barker from another concern on December 23, 1952, with a $20,000 down payment on January 23, 1953. By letter of February 1, 1953 Nicholson said he *had* sold other machines through shop exhibits and tests. At trial he explained that these were not actually sales but simply verbal understandings. He also testified the machine did not go into operation at Cascade's mill until after February 1, 1953, saying that 30 to 60 days' actual operation was necessary before the machine could be considered proved. The final payment by Cascade was made on April 17, 1953.

[1] The record discloses that under Rule 131 of the Patent Office an affidavit was filed by Nicholson to the effect that the machine was built and used successfully in the United States prior to October 31, 1952. The purpose of the rule is to fix a completion date of the device to be patented in order to ascertain if it has been preceded by another domestic or foreign patent. Nicholson testified he did not know of this implication.

[2, 3] These unquestioned facts, in the opinion of the District Judge, constituted a public use and sale of the Nicholson machine prior to one year before the patent application. Either of these circumstances would invalidate the patent. We concur in his judgment that both obtain here.

[4, 5] Tests and experimentation are not disclosures within the meaning of the statute. Long Mfg. Co. v. Holliday, 246 F.2d 95 (4 Cir., 1957), cert. denied, 355 U.S. 926, 78 S.Ct. 384, 2 L.Ed.2d 357 (1958). Nor do they prove a "public use". Elizabeth v. Pavement Co., 97 U.S. 126, 134, 24 L.Ed. 1000 (1877). But the incidents just related prove

to be far more than tests and experimentation. These had been completed as early as the fall of 1952, the machine doing a "wonderful job". So successful indeed had it been that the lumber industy was publicly solicited to buy in September and November, 1952. Furthermore, the exhibition of the machine on September 23, 1952 had been unconcealed. The audience of about 50 consisted of persons having an interest in barking machines. The occasion was a step in the commercial advancement of the device, not mere experimentation or test. Egbert v. Lippmann, 104 U.S. 333, 336, 26 L.Ed. 755 (1881). These events, certainly in the aggregate, manifest a "public" use within the intendment of the statute. As was said in Egbert v. Lippmann, where the use is "without limitation or restriction, or injunction of secrecy * * * such use is public even though the use and knowledge of the use may be confined to one person".

[6] Again, the machine was certainly put on sale before February 1, 1953. In this we do not overlook those authorities holding that "sale" means not simply a contract of sale but a delivery and acceptance of the article if it is one to be thereafter constructed. B. F. Sturtevant Co. v. Massachusetts Hair & Felt Co., 124 F.2d 95, 97 (1 Cir., 1941), cert. denied, 315 U.S. 823, 62 S.Ct. 917, 86 L.Ed. 1219 (1942); McCreery Engineering Co. v. Massachusetts Fan Co., 195 F. 498, 503 (C.C.A. 1, 1912); F. E. Myers & Bro. Co. v. Goulds' Pumps, 91 F.Supp. 475, 497 (W.D.N.Y. 1950). But see, Henry v. The Francestown Soap-Stone Co., 2 F. 78, 80 (D.N.H. 1880). However, as we have seen, instantly there were advertisements and numerous sales before the crucial date; and, notwithstanding each unit had to be made and assembled, "the invention had been reduced to practice" and "proven to have been * * * completed" several months before the sales. Moreover, the original barker was actually shipped to Cascade in November or December, 1952. Further, a substantial down payment—$20,000—had been made January 23, 1953 on the

order placed December 23, 1952 and the order was described as "firm". Finally, Nicholson admitted that he had by February 1, 1953 sold other machines. None of the sales other than Cascade's was shown to be conditional. In our judgment the multiple dispositions in the circumstances prove quite clearly and convincingly that the machine was the subject of "sale" before February 1, 1953.

[7] But the paramount factor in our determinations—and regardless of where the burden lies in respect to the invocation of the statute, Aerovox Corp. v. Polymet Mfg. Corp., 67 F.2d 860 (2 Cir., 1933)—is the affidavit made by Nicholson before the Patent Office under Rule 131. There he avowed that the machine was "built and used for successfully removing bark from logs" in the United States prior to October 31, 1952. This affidavit was essential to Nicholson, for without it he could not have obtained his patent. We cannot accept his explanation that he was not aware of the effect of the affidavit. Certainly his counsel was so advised and this knowledge must be imputed to Nicholson. The affidavit establishes the completion date of the machine. This uncontrovertible date, when considered with the public exhibition, the advertisements of sale and the sales, all before February 1, 1953 affirmatively prove, as the District Judge held, that the machine was disclosed to the public well before the period protected by the statute.

II. The Mullis Machine, Nicholson insists, infringes his 496 barker's first claim, particularly in respect to the cutting tool. That claim is:

> "1. A log-barking machine comprising log-supporting means, a scraper blade having a substantially angular log-engaging edge formed by the convergence of two substantially planar surfaces toward such edge and elongated lengthwise of a log supported by said log-supporting means, said log-engaging blade edge being straight substantially throughout its length, means operable to effect relative move-

ment between said blade and such log in a direction circumferentially of such log with said log-engaging edge of said blade engaged therewith to scrape bark therefrom, and means supporting such scraper blade with one of such substantially planar converging surfaces forming the leading surface of said scraper blade and disposed generally parallel to the longitudinal axis of such log, but with the angle, between such leading surface of said scraper blade and a tangential plane which is perpendicular to a diametric plane of such log extending to said log-engaging edge, being at least as small as a right angle."

[8] This patent was applied for August 27, 1954 and issued August 13, 1957, while the Mullis patent was filed July 15, 1957 and issued October 13, 1959. The District Court found that Nicholson's 496 Claim 1, which alone is sought to be vindicated in this suit, was anticipated by the Stoltz German patent, 522,701, issued April 13, 1931. It is clear 496 cannot stand as against Stoltz.

Claim 1 of Stoltz reads:

> "1. A debarking machine comprizing a cutter mounted on a swinging arm under the pressure of a spring and oscillating around a shaft parallel to the axis of rotation of the trunk, characterized in that a tracer or protective arm is provided in front of the cutter in the direction of rotation, said tracer or protective arm being fixedly connected to the cutter holder and extending far enough to absorb shocks or impacts caused by protruding portions of the tree trunk being debarked and therefore lifting the cutter holder from its position of work in the direction of rotation."

This claim itself demonstrates the kinship of 496 and Stoltz. The principle of operation of the two is almost identical. Nicholson does not have the Stoltz tracer—a protective arm—in front of the cutter but this difference does not distinguish the two.

In layman's language each of them may be described in this way: By appropriate supporting means a log is held in a horizontal position and rotated. Against it is placed a scraper blade or tool which engages the log. The scraper blade or tool is held by an arm, pivoted at the bottom, inclined towards the log and the tool applied to the log by the force, on the arm, of a spring (in Stoltz) or by attachment to a piston working out of a cylinder containing fluid pressure (in Nicholson 496). The cutting tool or blade consists of the edge of a metal plate. The difference between the blades or tools in the Nicholson and Stoltz devices in our opinion is not material.

As we join the District Court in the view that Claim 1 of Nicholson 496 is invalid as anticipated by Stoltz, of course there is no infringement of 496 by Mullis.

[9, 10] III. The Mullis patent is No. 2,908,302, applied for on July 15, 1957 and issued October 13, 1959. The District Judge concluded that "[t]his combination was new and I find the Mullis patent valid." His conclusion was not evolved from conflicting testimony but rather upon a comparative reading of the patents. Inasmuch as these documents are equally as available to us, the resolution of the question of patent validity by the trial court is not as binding here as would be a factual ascertainment upon varying evidence under Rule 52(a) F.R.Civ.P., Kiwi Coders Corp. v. Acro Tool & Die Works, 250 F.2d 562 (7 Cir., 1957). Our examination convinces us that Brundell's patent, No. 2,786,499, filed March 22, 1954, issued March 26, 1957 clearly anticipated Mullis.

No. 8 is the only claim of the Mullis patent in question. The best description of that machine is written in the claim:

> "8. In a log-skinning machine, a rotary reel assembly having a central passage for the axial movement of logs therethrough, a plurality of askew-shaped arms pivotally mounted on said reel for movement towards the center of said passage; bark-removing elements mounted on the inner ends of said arms, an annular tank containing a fluid under pressure surrounding said reel and carried thereby, fluid pressure operated means mounted on the inner peripheral wall of said tank in communication with the interior of said tank, said means having connection with said arms to exert a constant pressure on the arms; and means for rotating said reel."

It must be remembered, as the District Judge stated in his conclusions, that the ring type of barker did not originate with Mullis. It is found, among others, in: Brundell; Emery, 2,477,922, August 2, 1949; Whitlock, 2,591,751, April 8, 1952; as well as Nicholson 495 already discussed. These have various means of exerting force upon the tool arm, including hydraulic and pneumatic actuation. Indeed, Nicholson 495 used air pressure in independent and isolated cylinders.

The inventiveness asserted by Mullis, and found by the Court, was pointedly noted in the District Judge's opinion as follows:

> "Mullis devised a machine which incorporated a number of features which Nicholson's own expert admitted he had never seen before in combination. *It has a source of pressure fluid carried by the ring, so that no outside supply is needed*, and there are *no sealing joints required* between the ring and the stationary part of the machine. *The source is connected to all the cylinders so that the pressure is equalized on all the tool-carrying arms. The arms are 'askew'* that is, they have curved front edges so that, when the

butt end of a log strikes them, *they open automatically* and apply the tool to the log. [Emphasis added]

"No patent in the prior art and no machine known to plaintiff or his expert, has a self-contained reservoir of pressure fluid in the ring connected to all the cylinders with self-opening askew arms * * *"

Finding No. 52 of the District Judge had already well detailed the first of the two advantages in this way:

"A valve allows the operator, while the machine is stationary, to supply compressed air to the inside of the hollow ring. This causes a pressure on the pistons which pushes them against the log as it passes through the ring."

This initial aspect of inventiveness—the annular tank containing fluid under pressure by air or gas inserted into the tank before commencement of its operation, and dispensing with connections between the ring and the stationary part of the machine to obtain air or gas—is not novel. Equalization of the pressure on the several arms by a common, or inter-connected, source of pressure is found in Brundell, 2,786,499. At the same time, Brundell specified the introduction of the pressure fluid at a single point in the ring and no constant supply was needed from the outside during operation. Column 3, lines 54-65 give this description of these two elements:

"It is believed clear that liquid can be forced into the *hydraulic system by hand pump*, not shown, adapted for coupling with the conduit. Inasmuch as the liquid circuit is in communication with all of the piston cylinders, introducing the liquid under pressure at one point will place the same pressure in each cylinder so that the tension of the rubber bands will be equal for each tool. Any differences between the rubber bands as occasioned by different settings will auto-

> matically be compensated for. The pressure gauge will furnish a reading that is proportional to the actuating force of a tool against a log." [Emphasis added]

True, Brundell used rubber bands as a connection to hold the cutting arm and tool in place. But in a modified arrangement for regulating the tension of the bands a piston rod in a cylinder is attached to one end of the bands, and fluid is introduced into the cylinder in front of the piston to control its movement. The fluid for all of the cylinders flows in a common conduit about the ring.

As to the other alleged aspect of novelty—"self-opening askew arms"—the equivalent is found in the specifications of Brundell as follows:

> "[T]he swingable arms being of such a shape that when they are contacted by an oncoming log, *they are automatically swung outward* as they ride over the butt end of the log, the tools thus being moved onto the peripheral surface of a log * * *" Column 2, lines 36-40. [Emphasis added]

Finding 60 of the District Court specifically states that Brundell has "self-opening arms".

Thus Claim 8 of Mullis cannot stand. In this only do we disagree with the trial judge's thorough analysis of the entire case. In reaching the decision to invalidate Nicholson 495, Nicholson 496, and Mullis we are not unaware of the presumptive validity of a patent by virtue of 35 U.S.C. § 282, but we think the prior public disclosure of 495 and the preconception of 496 and Mullis in earlier patents have been well and adequately demonstrated.

The decree in review will be affirmed except insofar as it enjoins the manufacture, use or sale of the Accumat or other machines embodying the principles of Claim 8 in Mullis patent No. 2,908,302 and awards an accounting by

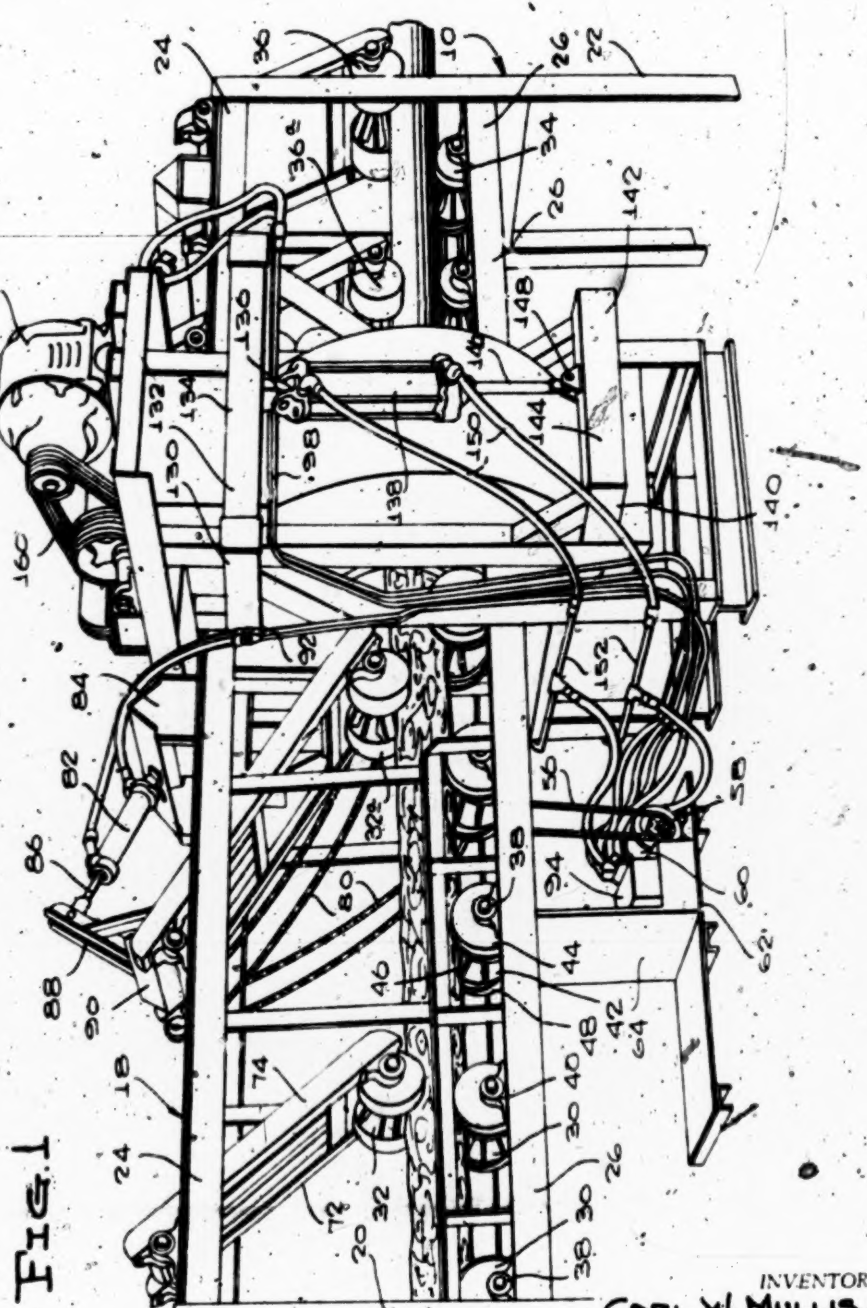
Nicholson to the defendants Mullis, this part of the decree being reversed. The cause will be remanded for dismissal of both the complaint and the counterclaim. Costs on appeal will be divided equally between the appellant on the one hand and the appellees on the other.

Affirmed in part; reversed in part; and remanded

Oct. 13, 1959 C. W. MULLIS, SR 2,908,302

ROTARY DEBARKER HAVING PIVOTABLE BARK-REMOVING TOOLS
BIASED BY FLUID UNDER PRESSURE IN AN ANNULAR TANK

Filed July 15, 1957 6 Sheets-Sheet 1


24
36
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36a
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84
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32a
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46
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90
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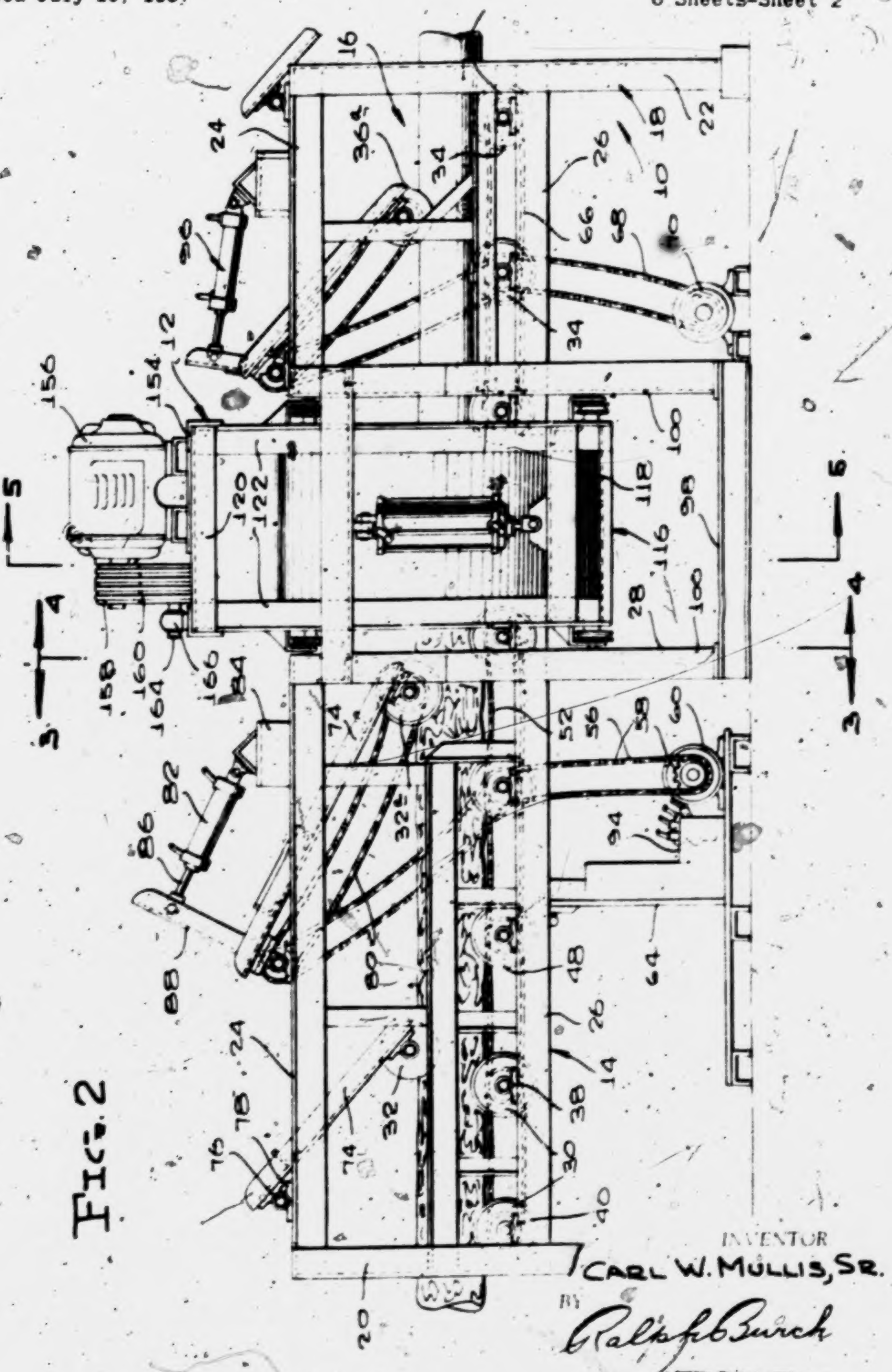
FIG. 1

INVENTOR
CARL W. MULLIS, SR.
BY Ralph B. Burch
ATTORNEY

Oct. 13, 1959 C. W. MULLIS, SR 2,908,302

ROTARY DEBARKER HAVING PIVOTABLE BARK-REMOVING TOOLS
BIASED BY FLUID UNDER PRESSURE IN AN ANNULAR TANK

Filed July 15, 1957 6 Sheets-Sheet 2


16
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36
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154
156
5
120
122
118
100
98
116
100
28
5
4
158
160
164
166
84
4
3
74
52
56
58
60
82
86
32a
94
88
80
48
64
24
26
14
78
76
74
32
38
30
40
20
3

FIG. 2

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ROTARY DEBARKER HAVING PIVOTABLE BARK-REMOVING TOOLS
BIASED BY FLUID UNDER PRESSURE IN AN ANNULAR TANK

Filed July 15, 1957 6 Sheets-Sheet 3

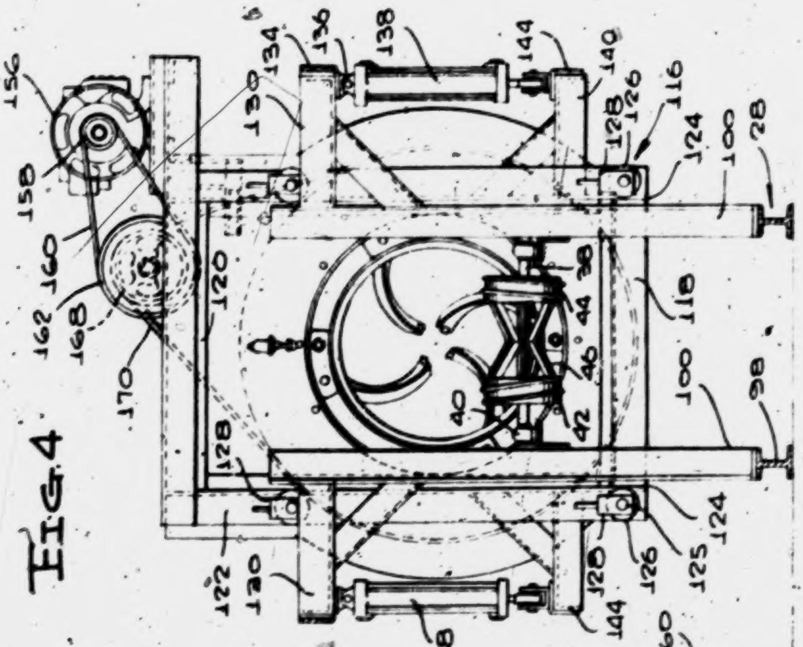
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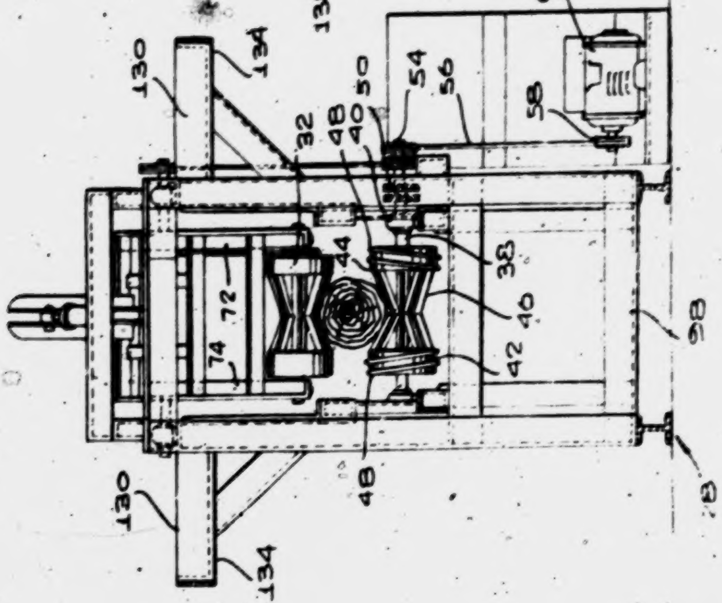
FIG. 4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130
134

FIG. 3

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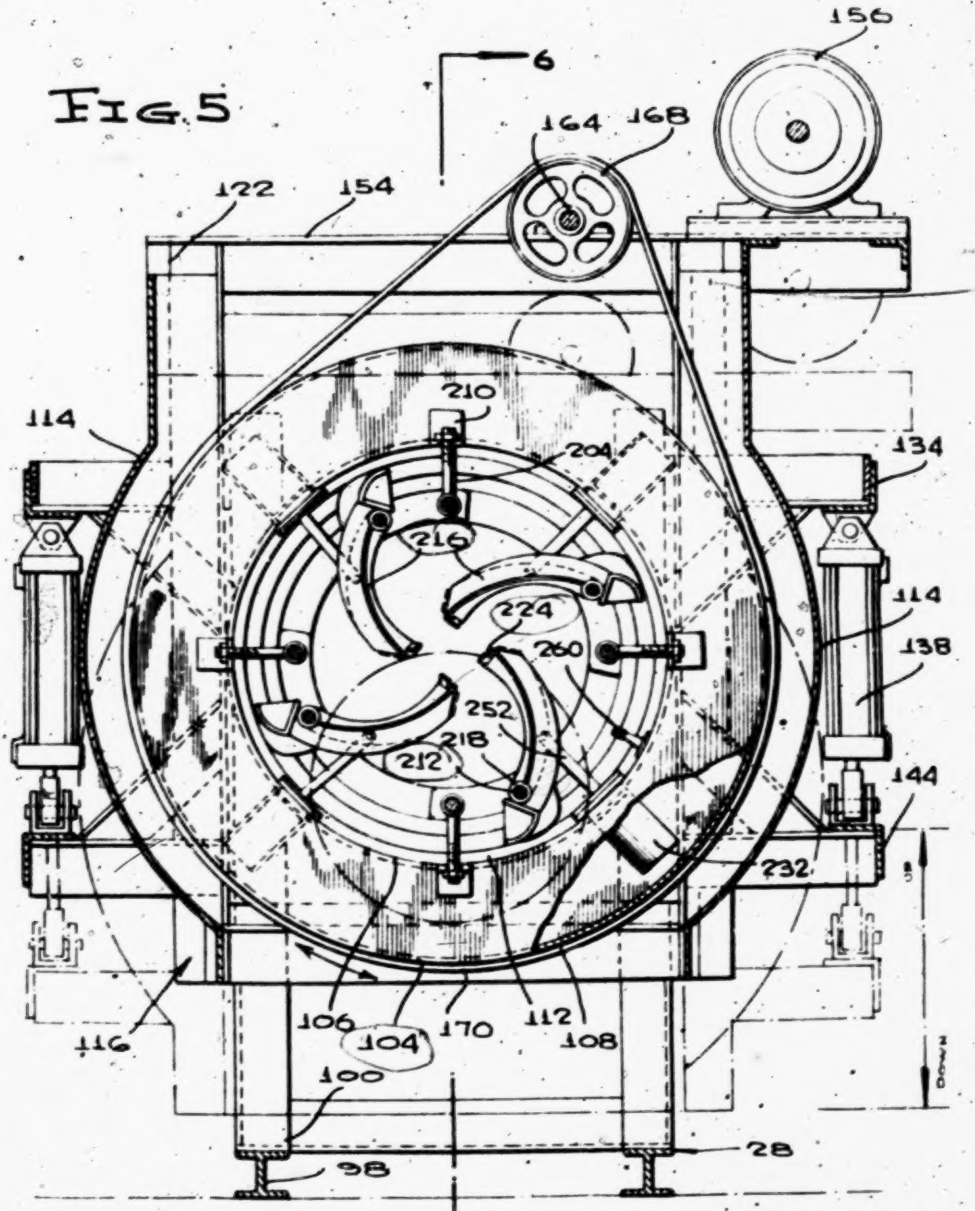
Filed July 15, 1957 6 Sheets-Sheet 4

FIG. 5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104
170
112
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116
100
28
98
DOWN
6

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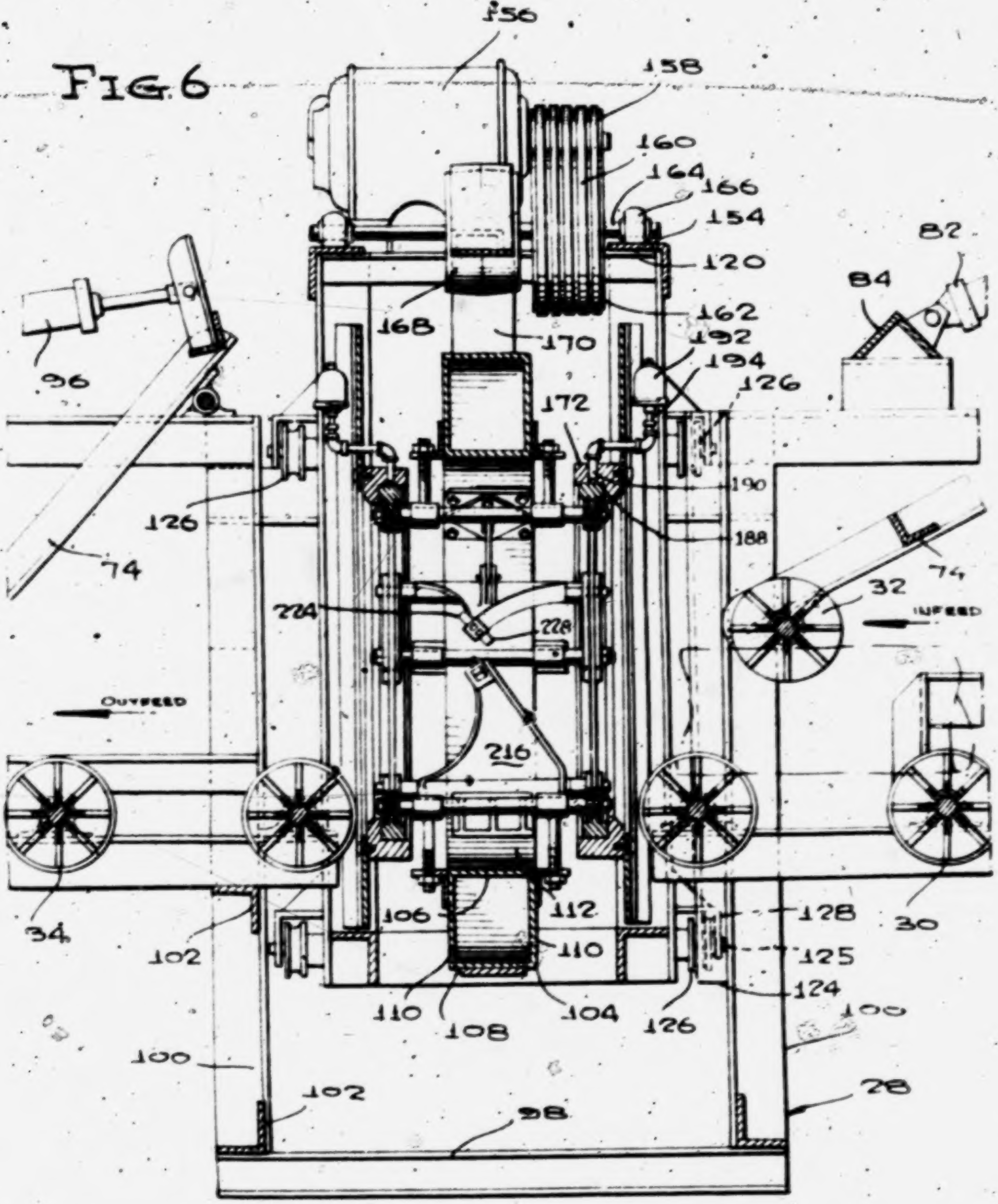
ROTARY DEBARKER HAVING PIVOTABLE BARK-REMOVING TOOLS
BIASED BY FLUID UNDER PRESSURE IN AN ANNULAR TANK

Filed July 15, 1957 6 Sheets-Sheet 5

FIG. 6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32
INFEED
OUTFEED
216
34
30
106
112
128
102
110
125
124
110
108
104
126
100
100
102
98
28

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ROTARY DEBARKER HAVING PIVOTABLE BARK-REMOVING TOOLS
BIASED BY FLUID UNDER PRESSURE IN AN ANNULAR TANK

Filed July 15, 1957 6 Sheets-Sheet 6

FIG. 7

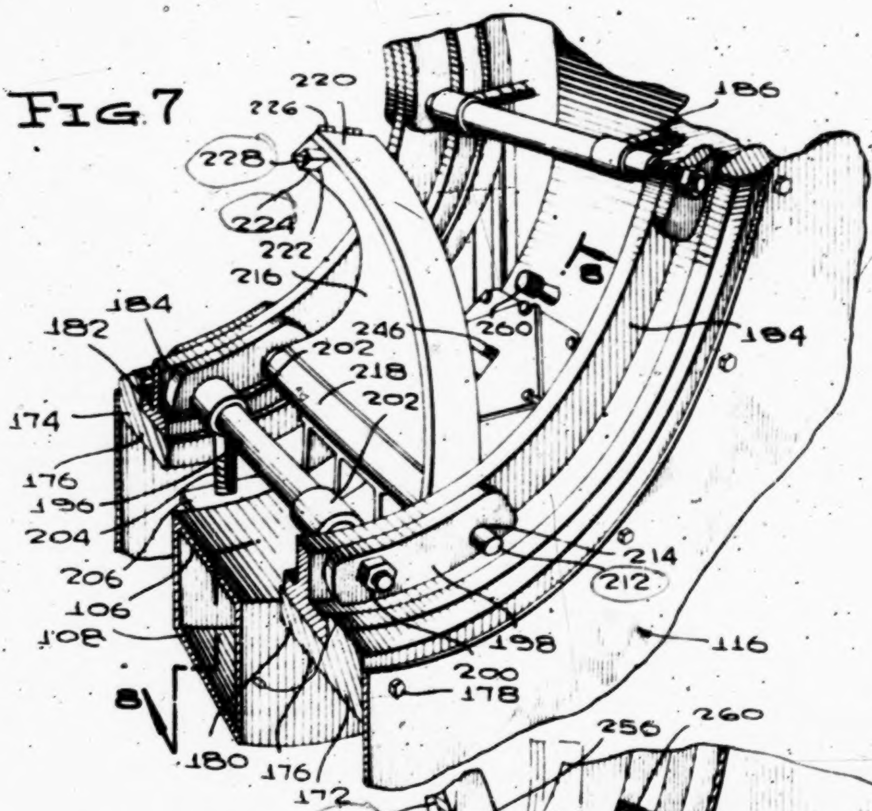
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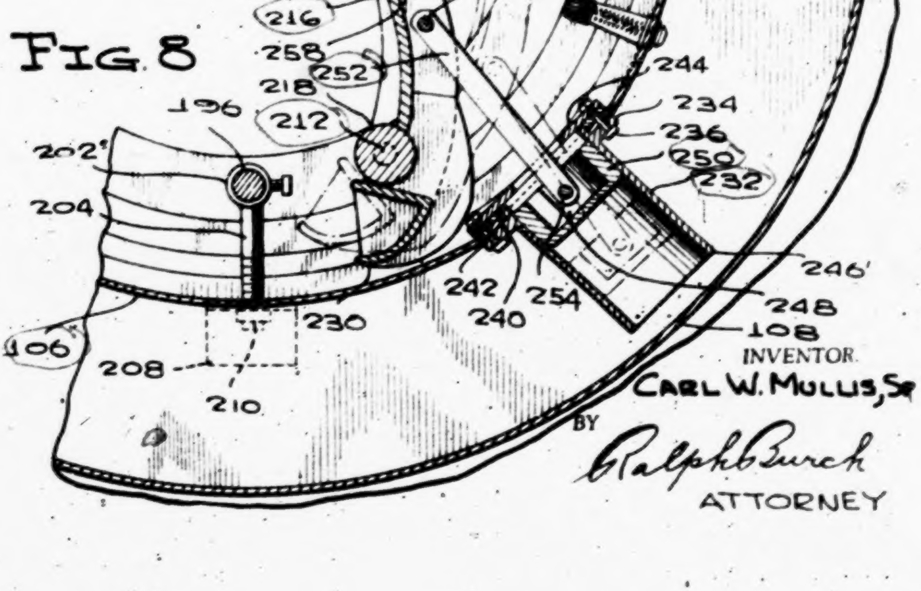
FIG. 8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108
230
106
208
210

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United States Patent Office

2,908,302

Patented Oct. 13, 1959

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ROTARY DEBARKER HAVING PIVOTABLE BARK-REMOVING TOOLS BIASED BY FLUID UNDER PRESSURE IN AN ANNULAR TANK

Carl W. Mullis, Sr., Lancaster, S.C.

Application July 15, 1957, Serial No. 671,747

10 Claims. (Cl. 144—208)

This invention appertains to improvements in apparatus for removing bark from logs and particularly relates to a novel and improved log-skinning apparatus.

A primary object of the present invention is to provide an automatic log-skinning machine, which efficiently, inexpensively and without hazard to the operators will skin the bark from all species of logs regardless of the diameter and shape thereof and the presence of hollows, ridges, knots or the like deformities in the logs.

Another important object of the present invention is to provide a log-skinning machine which will remove the bark cleanly from logs by constant pressure of bark-removing-tool means on the logs regardless of the form, shape and diameter of the logs.

A further important object of the present invention is to provide a rotary skinner assembly through which logs are axially passed and which carries skinning tools that are automatically maintained under constant pressure and automatically adjust themselves to the incoming logs to receive the logs and move between the bark and the wood in stripping the bark from the wood as the logs are moved axially and the skinner assembly is rotated around the logs. Generally, stated, the skinner assembly includes an annular closed reservoir or tank for air, gas or other fluid pressure medium, which is rotated by a drive means and has a large center opening for the axial passage therethrough of the logs. The tools extend radially inwardly from the doughnut-shaped tank, within the passage, and are pivotally carried thereby. Each tool is provided with a control means that is in communication with and responsive to the fluid pressure in the reservoir so that each tool is constantly and individually maintained under fluid pressure. The pressure, acting on the tools, maintains the tools in a closed position toward the center of the passage so that they are disposed within the path of movement of an incoming log which abuts the tools to spread them apart. The tools are moved radially outwardly, against the constant fluid pressure, because of their shape, by the force of the axial movement of the log and permit the log to pass therebetween and then are maintained on the log by the constant pressure. As the tank is rotated, the tools are carried around the axially moving log to skin the bark therefrom. Since each tool is separately and individually maintained under a constant pressure, each tool will automatically adjust itself to the log, so that the diameter, surface condition or shape of the log are immaterial and the log will be efficiently and

keep and replacement of the tool units is a fraction of the upkeep of the present debarking tools. The arm is formed at any desired askew angle in relationship to the center of the passage through the tank so that each arm is moved out by an incoming log and moves over and onto the log under the infeed force of the log and its own rotary motion.

Another important object of the present invention is to provide means for raising and lowering the rotary skinner assembly in relation to longitudinally aligned infeed and outfeed assemblies disposed at opposite sides of the passage through the skinner assembly so that each log may be easily and rapidly centered in the skinner assembly.

A still further important object of the present invention is to provide separately powered and controlled infeed and outfeed units which move the logs axially and which are driven at controlled speeds and which include novelly constructed rollers that move the logs axially while constantly retaining them in centered positions relative to the passage in the rotary skinner assembly.

The foregoing and ancillary objects, including the provision of a compact, inexpensive and easily operated skinning machine, are attained by this invention, the preferred embodiment of which is set forth in the following description and illustrated in the accompanying drawings, wherein:

Fig. 1 is a side perspective view of the log-skinning machine of this invention;

Fig. 2 is a side elevation thereof;

Fig. 3 is a transverse, vertical sectional view, taken on line 3—3 of Fig. 2;

Fig. 4 is a transverse, vertical sectional view, taken on line 4—4 of Fig. 2;

Fig. 5 is an enlarged cross-sectional view taken on line 5—5 of Fig. 2;

Fig. 6 is a detailed, longitudinal vertical sectional view, taken on line 6—6 of Fig. 5;

Fig. 7 is a detailed, fragmentary perspective view of one of the tool means and showing the mounting arrangement therefor; and,

Fig. 8 is a detailed vertical sectional view, taken on line 8—8 of Fig. 7.

Referring now more particularly to the accompanying drawings, the log-skinning machine 10 includes a skinner assembly 12 to which logs are fed by an infeed unit 14 and from which skinned logs are removed by an outfeed unit 16. The skinner assembly is located between the feed units and the assembly and units are supported by a framework 18.

The framework 18 includes opposing pairs of end legs 20 and 22 between which upper and lower sets 24 and 26 of longitudinally extending, transversely spaced side bars extend. The sets of side bars are reinforced by suitable bracing. The frame 28 for the skinner assembly is interposed between and connected to the side bars for the infeed and outfeed units.

The infeed unit includes a plurality of powered bottom rollers 30 and a pair of hold-down rollers 32 on top. Similarly, the outfeed unit is composed of bottom powered or driven rollers 34 and upper hold-down rollers

PRESSURE IN AN ANNULAR TANK

Carl W. Mullis, Sr., Lancaster, S.C.

Application July 15, 1957, Serial No. 671,747

10 Claims. (Cl. 144—208)

This invention appertains to improvements in apparatus for removing bark from logs and particularly relates to a novel and improved log-skinning apparatus.

A primary object of the present invention is to provide an automatic log-skinning machine, which efficiently, inexpensively and without hazard to the operators will skin the bark from all species of logs regardless of the diameter and shape thereof and the presence of hollows, ridges, knots or the like deformities in the logs.

Another important object of the present invention is to provide a log-skinning machine which will remove the bark cleanly from logs by constant pressure of bark-removing-tool means on the logs regardless of the form, shape and diameter of the logs.

A further important object of the present invention is to provide a rotary skinner assembly through which logs are axially passed and which carries skinning tools that are automatically maintained under constant pressure and automatically adjust themselves to the incoming logs to receive the logs and move between the bark and the wood in stripping the bark from the wood as the logs are moved axially and the skinner assembly is rotated around the logs. Generally, stated, the skinner assembly includes an annular closed reservoir or tank for air, gas or other fluid pressure medium, which is rotated by a drive means and has a large center opening for the axial passage therethrough of the logs. The tools extend radially inwardly from the doughnut-shaped tank, within the passage, and are pivotally carried thereby. Each tool is provided with a control means that is in communication with and responsive to the fluid pressure in the reservoir so that each tool is constantly and individually maintained under fluid pressure. The pressure, acting on the tools, maintains the tools in a closed position toward the center of the passage so that they are disposed within the path of movement of an incoming log which abuts the tools to spread them apart. The tools are moved radially outwardly, against the constant fluid pressure, because of their shape, by the force of the axial movement of the log and permit the log to pass therebetween and then are maintained on the log by the constant pressure. As the tank is rotated, the tools are carried around the axially moving log to skin the bark therefrom. Since each tool is separately and individually maintained under a constant pressure, each tool will automatically adjust itself to the log, so that the diameter, surface condition or shape of the log are immaterial and the log will be efficiently and cleanly skinned regardless of such factors. The variance of such factors in various logs is unimportant in the operation of the machine.

A further important object of this invention is to provide a tool unit which includes an askew-angle-shaped skinning arm that is pivoted at one end to the inner periphery of the annular tank; and is provided at its other or free end with a cutting bead that is welded thereon and is easily replaceable. The cutting bead is the only part that normally requires replacement and a new bead can be easily and inexpensively welded on so that the up- rotary motion.

Another important object of the present invention is to provide means for raising and lowering the rotary skinner assembly in relation to longitudinally aligned infeed and outfeed assemblies disposed at opposite sides of the passage through the skinner assembly so that each log may be easily and rapidly centered in the skinner assembly.

A still further important object of the present invention is to provide separately powered and controlled infeed and outfeed units which move the logs axially and which are driven at controlled speeds and which include novelly constructed rollers that move the logs axially while constantly retaining them in centered positions relative to the passage in the rotary skinner assembly.

The foregoing and ancillary objects, including the provision of a compact, inexpensive and easily operated skinning machine, are attained by this invention, the preferred embodiment of which is set forth in the following description and illustrated in the accompanying drawings, wherein:

Fig. 1 is a side perspective view of the log-skinning machine of this invention;

Fig. 2 is a side elevation thereof;

Fig. 3 is a transverse, vertical sectional view, taken on line 3—3 of Fig. 2;

Fig. 4 is a transverse, vertical sectional view, taken on line 4—4 of Fig. 2;

Fig. 5 is an enlarged cross-sectional view taken on line 5—5 of Fig. 2;

Fig. 6 is a detailed, longitudinal vertical sectional view, taken on line 6—6 of Fig. 5;

Fig. 7 is a detailed, fragmentary perspective view of one of the tool means and showing the mounting arrangement therefor; and,

Fig. 8 is a detailed vertical sectional view, taken on line 8—8 of Fig. 7.

Referring now more particularly to the accompanying drawings, the log-skinning machine **10** includes a skinner assembly **12** to which logs are fed by an infeed unit **14** and from which skinned logs are removed by an outfeed unit **16**. The skinner assembly is located between the feed units and the assembly and units are supported by a framework **18**.

The framework **18** includes opposing pairs of end legs **20** and **22** between which upper and lower sets **24** and **26** of longitudinally extending, transversely spaced side bars extend. The sets of side bars are reinforced by suitable bracing. The frame **28** for the skinner assembly is interposed between and connected to the side bars for the infeed and outfeed units.

The infeed unit includes a plurality of powered bottom rollers **30** and a pair of hold-down rollers **32** on top. Similarly, the outfeed unit is composed of bottom powered or driven rollers **34** and upper hold-down rollers **36**. The bottom rollers **30** and **34** are rotatably journaled transversely between the opposing side bars of the bottom set **26** and are arranged in longitudinally spaced fashion. The rollers **30** and **34** include shafts **38** which are rotatably journaled in bearing blocks **40** mounted on the side bars of the bottom bars **26**. End plates **42** and **44** are fixed on the shafts in axially spaced fashion thereon and are located between the side bars. V-shaped bars **46** extend between the end plates and have their apices fitted on the shafts so as to provide the concave hub for the rollers. The bars **46** are arranged sidewise relative to the logs which are cradled thereby.

The end plates **42** and **44** of the rollers are formed on their peripheral surfaces with spirally arranged ribs **48** that serve to center the logs, at all times, on the hubs of the rollers and prevent the logs from riding over onto the end plates. It is to be noted, as shown in Figs. 3 and 4, that the ribs on the opposing end plates are oppositely spiralled so that they push the logs back onto the hubs if the logs try to ride over the end plates off of the hubs.

The shafts **38** for the rollers **30** of the infeed unit have their ends projecting beyond one of the side bars and sprockets **50** are fixed on the extending ends and are interconnected by an endless drive chain **52**. One of the shafts is provided with an additional pulley or sprocket means **54** that receives a drive chain **56** which is powered by a drive sprocket **58** on the shaft of a reversible electric motor **60**. The motor **60** is mounted on a suitable subframe structure **62** which may provide a support for a control panel and operator's station **64**.

The shafts **38** for the rollers **34** are drivingly interconnected by a chain **66** and are driven by a drive chain **68** from a reversible electric motor **70** that is suitably supported at the inner end of the outfeed unit.

The motors **60** and **70** may be separately controlled or they can be synchronized for forward or reverse movement. The rate of lineal-feet movement of the logs per minute can be varied by an operator who controls the motors **60** and **70** by suitable push button controls on the control panel.

The upper hold-down rollers **32** of the infeed unit are similar in construction to the rollers **30** but the end plates are formed without the ribs. The rollers **32** are rotatably journaled between the lower ends of a pair of arms **72** and **74** which are fixed at their upper ends on a rod **76** that is rotatably journaled in pillow blocks **78** on the upper set of side bars. The arms are suitably braced. The arms hang down from the upper side bars and support the rollers **32** at their lower ends so that the rollers bear on the logs to hold the logs down on the bottom rollers. Certain of the upper rollers, for example, the roller **32***a* is powered by a chain transmission means **80** from one of the shafts **38** for one of the bottom rollers. The other rollers may idle or may also be driven in a similar fashion.

The powered roller **32***a* is provided with a hydraulic hold-down means while the idler rollers bear, by gravity and the weight of their supporting arms, on the logs. The hydraulic hold-down means includes a hydraulic cylinder **82** which is mounted, at its closed end, on a support **84** that is mounted transversely on the side bars of the upper set **24**. The piston rod **86** of the cylinder is pivotally connected to an upright bar **88** which is fixed by a transverse angle iron **90** to the upper ends of the arms **72** and **74**. Inlet and outlet hydraulic lines **92** extend from the cylinder to a supply means **94** and the flow of hydraulic fluid through the lines is controlled by valve means operated from the control panel.

The upper hold-down rollers **36** for the outfeed unit are formed, arranged and mounted similar to the rollers [illegible] and one of the rollers **36***a* is powered and is held down by a hydraulic cylinder arrangement **96** similar to that described in connection with the roller **32***a*. The hydraulic cylinder of the arrangement **96** is actuated by hydraulic pressure from the source **94** through hoses **98** and is controlled separately from the cylinder **82**.

The arms **72** and **74**, which form a swinging frame for the rollers **32** and **36**, slope downwardly, in the case of the rollers **32** toward the skinner assem[illegible]

the logs regardless of the shape, diameter or surface condition thereof.

The skinner assembly **12** includes the fixed frame **28** which comprises a base **98** from which supporting standards **100** upstand. Suitable cross braces **102** are provided and the standards are suitably secured to the inner ends of the upper and the lower sets of side bars **24** and **26**.

An annular or doughnut-shaped ring or tank **104** forms a closed reservoir for a fluid pressure medium, such as, compressed air, gas, steam or the like, and is disposed transversely of the passage defined by the infeed and outfeed units and is positioned within the frame **28** and supported in a manner to be described. The annular tank **104**, as shown in Fig. 6, has concentric inner and outer peripheral walls **106** and **108** and opposing side walls **110**. The inner wall **106** defines a passage **112** which is alignable with the passageways defined by the rollers of the feed units to receive a log.

An annular protective casing or housing **114** surrounds the tank with the passage **112** being left open, the housing being shaped to the contour of the ring tank and being spaced therefrom and being formed from suitable metal sections so as to be easily removable. The housing is supported by a heavy, welded steel frame **116** which includes a rectangular, open bottom framework **118** and a similar upper framework **120**, the frameworks being connected in vertically spaced relation by corner posts **122**.

The frame **116** is vertically disposed between the longitudinally spaced pairs of transversely aligned standards and the posts **122** are disposed laterally outwardly of the standards **100** and adjacent thereto. The standards have tracks **124** formed vertically on their outer side faces. Rollers **126** are rotatably journalled on shafts **125** mounted horizontally in housings **128** which are secured to the outer side faces of the posts **122**, as shown in Figs. 2 and 4, and the rollers ride on the tracks **124** to guide the frame **116** in its vertical movements. The rollers guide and stabilize the frame for vertical movement.

Adjacent their upper ends, the standards **100** have laterally outstanding arms **130** which are connected at their outer ends by a cross bar **132**. The arms **130** and the cross bar provide horizontal supports **134** on each side of the frame **28** and, by means of a depending ear **136** on the cross bars, a hydraulic cylinder **138** is pivoted at its closed end to each horizontal support **134**. The lower ends of the posts **122** have laterally outstanding arms **140** which are connected by cross bars **142** to provide horizontal supports **144** which underlie the supports **134**. The outer ends of the piston rods **146** of the cylinders **138** are pivoted by ears **148** to the cross bars **142**. Hydraulic inlet and outlet lines **150** extend from the cylinders, through suitable pipe connections **152**, to the source **94** and suitable control valves are provided and are preferably mounted on the control panel **64**.

By means of such hydraulic cylinder arrangement and the guide means between the fixed frame **28** and the movable frame **116**, the frame **116**, which carries the skinner means, can be easily raised and lowered to permit rapid centering of each log in the skinner means.

A platform **154** is mounted on the upper framework **120** and supports an electric motor **156**, the operation of which is controlled by suitable controls on the control panel **64**. A multiple sheave **158** is fixed on the armature shaft of the motor and is connected by a bank of belts **160** to a multiple sheave **162** which is fixed on a shaft **164**. The shaft **164** is journalled on the platform by means of [illegible]

4, that the ribs on the opposing end plates are oppositely spiralled so that they push the logs back onto the hubs if the logs try to ride over the end plates off of the hubs.

The shafts **38** for the rollers **30** of the infeed unit have their ends projecting beyond one of the side bars and sprockets **50** are fixed on the extending ends and are interconnected by an endless drive chain **52**. One of the shafts is provided with an additional pulley or sprocket means **54** that receives a drive chain **56** which is powered by a drive sprocket **58** on the shaft of a reversible electric motor **60**. The motor **60** is mounted on a suitable subframe structure **62** which may provide a support for a control panel and operator's station **64**.

The shafts **38** for the rollers **34** are drivingly interconnected by a chain **66** and are driven by a drive chain **68** from a reversible electric motor **70** that is suitably supported at the inner end of the outfeed unit.

The motors **60** and **70** may be separately controlled or they can be synchronized for forward or reverse movement. The rate of lineal-feet movement of the logs per minute can be varied by an operator who controls the motors **60** and **70** by suitable push button controls on the control panel.

The upper hold-down rollers **32** of the infeed unit are similar in construction to the rollers **30** but the end plates are formed without the ribs. The rollers **32** are rotatably journaled between the lower ends of a pair of arms **72** and **74** which are fixed at their upper ends on a rod **76** that is rotatably journaled in pillow blocks **78** on the upper set of side bars. The arms are suitably braced. The arms hang down from the upper side bars and support the rollers **32** at their lower ends so that the rollers bear on the logs to hold the logs down on the bottom rollers. Certain of the upper rollers, for example, the roller **32***a* is powered by a chain transmission means **80** from one of the shafts **38** for one of the bottom rollers. The other rollers may idle or may also be driven in a similar fashion.

The powered roller **32***a* is provided with a hydraulic hold-down means while the idler rollers bear, by gravity and the weight of their supporting arms, on the logs. The hydraulic hold-down means includes a hydraulic cylinder **82** which is mounted, at its closed end, on a support **84** that is mounted transversely on the side bars of the upper set **24**. The piston rod **86** of the cylinder is pivotally connected to an upright bar **88** which is fixed by a transverse angle iron **90** to the upper ends of the arms **72** and **74**. Inlet and outlet hydraulic lines **92** extend from the cylinder to a supply means **94** and the flow of hydraulic fluid through the lines is controlled by valve means operated from the control panel.

The upper hold-down rollers **36** for the outfeed unit are formed, arranged and mounted similar to the rollers **32** and one of the rollers **36***a* is powered and is held down by a hydraulic cylinder arrangement **96** similar to that described in connection with the roller **32***a*. The hydraulic cylinder of the arrangement **96** is actuated by hydraulic pressure from the source **94** through hoses **98** and is controlled separately from the cylinder **82**.

The arms **72** and **74**, which form a swinging frame for the rollers **32** and **36**, slope downwardly, in the case of the rollers **32** toward the skinner assembly **12** and in the case of the rollers **36** away from the skinner assembly and, either by weight and gravity or by positive hydraulic means, hold the rollers **32** and **36** in contact with the logs so that the rollers hold the logs down on the rollers **30** and **34** to ensure a positive, nonslipping axial feed of and **26**.

An annular or doughnut-shaped ring or tank **104** forms a closed reservoir for a fluid pressure medium, such as, compressed air, gas, steam or the like, and is disposed transversely of the passage defined by the infeed and outfeed units and is positioned within the frame **28** and supported in a manner to be described. The annular tank **104**, as shown in Fig. 6, has concentric inner and outer peripheral walls **106** and **108** and opposing side walls **110**. The inner wall **106** defines a passage **112** which is alignable with the passageways defined by the rollers of the feed units to receive a log.

An annular protective casing or housing **114** surrounds the tank with the passage **112** being left open, the housing being shaped to the contour of the ring tank and being spaced therefrom and being formed from suitable metal sections so as to be easily removable. The housing is supported by a heavy, welded steel frame **116** which includes a rectangular, open bottom framework **118** and a similar upper framework **120**, the frameworks being connected in vertically spaced relation by corner posts **122**.

The frame **116** is vertically disposed between the longitudinally spaced pairs of transversely aligned standards and the posts **122** are disposed laterally outwardly of the standards **100** and adjacent thereto. The standards have tracks **124** formed vertically on their outer side faces. Rollers **126** are rotatably journalled on shafts **125** mounted horizontally in housings **128** which are secured to the outer side faces of the posts **122**, as shown in Figs. 2 and 4, and the rollers ride on the tracks **124** to guide the frame **116** in its vertical movements. The rollers guide and stabilize the frame for vertical movement.

Adjacent their upper ends, the standards **100** have laterally outstanding arms **130** which are connected at their outer ends by a cross bar **132**. The arms **130** and the cross bar provide horizontal supports **134** on each side of the frame **28** and, by means of a depending ear **136** on the cross bars, a hydraulic cylinder **138** is pivoted at its closed end to each horizontal support **134**. The lower ends of the posts **122** have laterally outstanding arms **140** which are connected by cross bars **142** to provide horizontal supports **144** which underlie the supports **134**. The outer ends of the piston rods **146** of the cylinders **138** are pivoted by ears **148** to the cross bars **142**. Hydraulic inlet and outlet lines **150** extend from the cylinders, through suitable pipe connections **152**, to the source **94** and suitable control valves are provided and are preferably mounted on the control panel **64**.

By means of such hydraulic cylinder arrangement and the guide means between the fixed frame **28** and the movable frame **116**, the frame **116**, which carries the skinner means, can be easily raised and lowered to permit rapid centering of each log in the skinner means.

A platform **154** is mounted on the upper framework **120** and supports an electric motor **156**, the operation of which is controlled by suitable controls on the control panel **64**. A multiple sheave **158** is fixed on the armature shaft of the motor and is connected by a bank of belts **160** to a multiple sheave **162** which is fixed on a shaft **164**. The shaft **164** is journalled on the platform by means of bearings **166** and is arranged longitudinally of the skinner machine. A large single flat pulley **168** is fixedly circumposed on the shaft **164** and carries a large flat belt **170** which is fitted around the outer peripheral wall **108** of the annular tank to rotate the tank, as will be described.

Disposed on each side of the rotatable tank 104 and spaced longitudinally of the skinner machine are stationary, annularly shaped cast-iron bearings 172 and 174 which are right angular in cross section. The circular or annular body portions 176 of the bearing races or rings are fastened by fasteners 178, in suitable manner, to the housing 114 and the frame 116. The bearing rings have inwardly extending radial flanges 180 on their outer edges. T-shaped rings 182 are rotatably mounted in the bearing rings with their head portions riding on the inner faces of the rings and the flanges. The radial flanges 184 of the rings extend inwardly and support a supporting means 186 for the tank so that the tank is attached to and supported for rotation by the rings 182 which rotate in the bearings and provide a rotating reel assembly.

The inner faces of the body portions 176 of the bearing rings are each formed with an annular lubricating groove 188 and the upper portion of each ring is formed with a bore 190 in communication with the grooves. Lubrication is supplied by a high pressure transmission lubricant which flows from a lubricating cup 192 mounted on the front and rear faces of the housing 114 through a pipe connection 194 to the bores.

The supporting means 186 includes a plurality of shafts 196 which extend transversely between and connect the flanges 184 of the rings 182. The ends of the shafts 196 are threaded and pass through openings in the flanges. Links 198 reinforce the flanges and nuts 200 secure the shafts to the flanges so as to space the rings axially and connect them together to form the reel assembly. The shafts are circumferentially spaced around the rings 182 and each shaft supports a pair of sleeves 202 which are spaced axially of the shafts. The sleeves 202 have rods 204 welded thereto at one of their ends. The opposing threaded ends of the rods 204 extend through openings in the laterally extending flanges 206 of angular brackets 208 which are secured to the sides 110 of the tank 104. Stay nuts 210 are threaded on the ends of the rods to fasten the brackets onto the rods and thereby attach the tank to the rotating reel assembly.

Pins 212 are fitted in aligned openings 214 in the opposing flanges 184 of the rings 182, such openings being formed through the reinforcing links 198. The pins extend through the center passage in the tank 104 and are disposed across the inner peripheral face 106 of the tank and extend longitudinally of the skinner machine. Askew-shaped skinner arms 216 are mounted on the pins 212 which act as pivots for the skinner arms. The skinner arms are triangularly shaped and have sleeves 218 formed on their major ends, the sleeves being rotatably circumposed on the pins. The arms extend radially inwardly from the peripheral face 106 of the tank and are spaced circumferentially thereof so as to converge with their minor ends 220 adjacent the center of the passage 112, as shown in Fig. 4. The minor ends 220 of the arms are formed with slots 222, arranged substantially at right angles to the pivot axis of the arms. A tool 224 is set in each slot and locked therein by bolts 226. A skinning bead 228 is welded on the end of each tool and is adapted to move between the bark and the wood in skinning the bark from the wood. The skinning bead is the only part of the tool means, which includes the skinner arms, that normally requires replacement. A new bead can be easily and inexpensively welded on so that the upkeep and maintenance of the tool means is a minimum one.

The skinner arms pivot about the pins 212 with the minor ends 220 swinging in toward the center of the passage 112. Each arm is identically formed with the askew angle being an angle of less than 90° in relation to compensate for the compound angle that is formed by the construction of the arm running from the outside point of the reel assembly at the pivot point to a desired point at any given distance from the center of the width of the reel assembly, thus forming an askew angle to the center of the reel assembly.

The tools 224 are preferably set at a 90° angle to the outside askew angle of the arm. The tools are made up from hot rolled steel or any other stock with a compound angle formed on the end of each tool in relationship to a line drawn through the center of the reel assembly.

The reel assembly and the tank are rotated by the belt 170 with the askew angle of the skinner arms pointing from the pivot point to the center at an askew angle from the direction of rotation, thus providing a yielding action to knots or other obstructions encountered in the path of rotation.

The major ends of the skinner arms are provided with counterweights 230 that are disposed radially outwardly of the pins 212 and swing about the pivot points radially outwardly thereof.

Means is provided for maintaining the skinner arms under constant fluid pressure and such means includes a connection between the interior of the tank 104 and each skinner arm.

As shown in Figs. 5 and 8, such means includes a plurality of open-ended cylinders 232, which are attached to the inner peripheral wall 106 of the tank and disposed in circumferentially spaced fashion within the tank, a cylinder being provided for each skinner arm. Each of the cylinders 232 is provided, adjacent its inner end, with a mounting flange 234, which is secured by bolt fasteners 236 to the inside of the peripheral wall 106 of the tank. The inner ends of the cylinders extend through openings 240 formed in the wall 106. Spacers 242 surround the inner ends and receive the bolt fasteners, with closure plates 244 being provided to close off the inner ends of the cylinders. The closure plates are formed with slots 246. The cylinders extend radially from the wall 106 and have their outer open ends 246' spaced from the outer wall 108. Thus, the fluid pressure from the tank is freely admitted to the cylinders. Pistons 248 are mounted for reciprocatory movement in the cylinders and are provided with packing cups 250, which may be formed from leather or synthetic materials and which prevent the fluid pressure from the tank reservoir from escaping as the tool means open and close during the process of skinning the bark from the logs. In this respect, connecting links 252 are pivoted, as at 254, to the pistons and extend through the slots 246 in the face plates 244. The outer ends of the connecting links are pivoted on pins 256, which are secured to the side flanges 258 on the skinner arms, as shown in Fig. 8.

A valve 260 is mounted on the inner wall 106 of the annular tank and provides the means whereby the supply of the fluid pressure medium in the tank may be replenished.

It is to be particularly noted that the skinning arms are designed and formed in the askew angle shape so that they will be automatically opened by the infeed force of the logs and the rotary action imparted to the arms and to the tools by the rotation of the annular tank. The skinner arms, by virtue of the piston and link connection between the arms and the pressure in the tank, are maintained under constant pressure regardless of changing log diameters and the surface conditions of the logs. The packing cups 250 on the pistons prevent the fluid pressure medium from escaping from the tank reservoir as the arms open and close during the process [illegible] housing 114 and the frame 116. The bearing rings have inwardly extending radial flanges 180 on their outer edges. T-shaped rings 182 are rotatably mounted in the bearing rings with their head portions riding on the inner faces of the rings and the flanges. The radial flanges 184 of the rings extend inwardly and support a supporting means 186 for the tank so that the tank is attached to and supported for rotation by the rings 182 which rotate in the bearings and provide a rotating reel assembly.

The inner faces of the body portions 176 of the bearing rings are each formed with an annular lubricating groove 188 and the upper portion of each ring is formed with a bore 190 in communication with the grooves. Lubrication is supplied by a high pressure transmission lubricant which flows from a lubricating cup 192 mounted on the front and rear faces of the housing 114 through a pipe connection 194 to the bores.

The supporting means 186 includes a plurality of shafts 196 which extend transversely between and connect the flanges 184 of the rings 182. The ends of the shafts 196 are threaded and pass through openings in the flanges. Links 198 reinforce the flanges and nuts 200 secure the shafts to the flanges so as to space the rings axially and connect them together to form the reel assembly. The shafts are circumferentially spaced around the rings 182 and each shaft supports a pair of sleeves 202 which are spaced axially of the shafts. The sleeves 202 have rods 204 welded thereto at one of their ends. The opposing threaded ends of the rods 204 extend through openings in the laterally extending flanges 206 of angular brackets 208 which are secured to the sides 110 of the tank 104. Stay nuts 210 are threaded on the ends of the rods to fasten the brackets onto the rods and thereby attach the tank to the rotating reel assembly.

Pins 212 are fitted in aligned openings 214 in the opposing flanges 184 of the rings 182, such openings being formed through the reinforcing links 198. The pins extend through the center passage in the tank 104 and are disposed across the inner peripheral face 106 of the tank and extend longitudinally of the skinner machine. Askew-shaped skinner arms 216 are mounted on the pins 212 which act as pivots for the skinner arms. The skinner arms are triangularly shaped and have sleeves 218 formed on their major ends, the sleeves being rotatably circumposed on the pins. The arms extend radially inwardly from the peripheral face 106 of the tank and are spaced circumferentially thereof so as to converge with their minor ends 220 adjacent the center of the passage 112, as shown in Fig. 4. The minor ends 220 of the arms are formed with slots 222, arranged substantially at right angles to the pivot axis of the arms. A tool 224 is set in each slot and locked therein by bolts 226. A skinning bead 228 is welded on the end of each tool and is adapted to move between the bark and the wood in skinning the bark from the wood. The skinning bead is the only part of the tool means, which includes the skinner arms, that normally requires replacement. A new bead can be easily and inexpensively welded on so that the upkeep and maintenance of the tool means is a minimum one.

The skinner arms pivot about the pins 212 with the minor ends 220 swinging in toward the center of the passage 112. Each arm is identically formed with the askew angle being an angle of less than 90° in relationship to the center of the reel assembly and the annular tank.

Each arm is constructed in an arc with the radius in relationship to the size of the passage 112 or size of the opening in the reel assembly, such radius to be made

The tools 224 are preferably set at a 90° angle to the outside askew angle of the arm. The tools are made up from hot rolled steel or any other stock with a compound angle formed on the end of each tool in relationship to a line drawn through the center of the reel assembly.

The reel assembly and the tank are rotated by the belt 170 with the askew angle of the skinner arms pointing from the pivot point to the center at an askew angle from the direction of rotation, thus providing a yielding action to knots or other obstructions encountered in the path of rotation.

The major ends of the skinner arms are provided with counterweights 230 that are disposed radially outwardly of the pins 212 and swing about the pivot points radially outwardly thereof.

Means is provided for maintaining the skinner arms under constant fluid pressure and such means includes a connection between the interior of the tank 108 and each skinner arm.

As shown in Figs. 5 and 8, such means includes a plurality of open-ended cylinders 232, which are attached to the inner peripheral wall 106 of the tank and disposed in circumferentially spaced fashion within the tank, a cylinder being provided for each skinner arm. Each of the cylinders 232 is provided, adjacent its inner end, with a mounting flange 234, which is secured by bolt fasteners 236 to the inside of the peripheral wall 106 of the tank. The inner ends of the cylinders extend through openings 240 formed in the wall 106. Spacers 242 surround the inner ends and receive the bolt fasteners, with closure plates 244 being provided to close off the inner ends of the cylinders. The closure plates are formed with slots 246. The cylinders extend radially from the wall 106 and have their outer open ends 246′ spaced from the outer wall 108. Thus, the fluid pressure from the tank is freely admitted to the cylinders. Pistons 248 are mounted for reciprocatory movement in the cylinders and are provided with packing cups 250, which may be formed from leather or synthetic materials and which prevent the fluid pressure from the tank reservoir from escaping as the tool means open and close during the process of skinning the bark from the logs. In this respect, connecting links 252 are pivoted, as at 254, to the pistons and extend through the slots 246 in the face plates 244. The outer ends of the connecting links are pivoted on pins 256, which are secured to the side flanges 258 on the skinner arms, as shown in Fig. 8.

A valve 260 is mounted on the inner wall 106 of the annular tank and provides the means whereby the supply of the fluid pressure medium in the tank may be replenished.

It is to be particularly noted that the skinning arms are designed and formed in the askew angle shape so that they will be automatically opened by the infeed force of the logs and the rotary action imparted to the arms and to the tools by the rotation of the annular tank. The skinner arms, by virtue of the piston and link connection between the arms and the pressure in the tank, are maintained under constant pressure regardless of changing log diameters and the surface conditions of the logs. The packing cups 250 on the pistons prevent the fluid pressure medium from escaping from the tank reservoir as the arms open and close during the process of receiving incoming logs and skinning the bark therefrom. The arms are always maintained at the center of the passage 112 through the annular tank until an incoming log forces the arms apart and spreads them radially outwardly, due to the askew angle action of the end of the incoming logs. The tank reservoir can be filled to any desired pressure and the pressure on the pistons 248 is always constant and is never exhausted, with the possible exception of the small seepage past the packing cups. If the pressure in the tank becomes too low for total bark removal, the tank can be refilled by means of the valve 260. In this respect, one fluid pressure medium which has proved extremely workable is compressed air and an operator can easily refill the pressure tank by means of an ordinary air compressor.

In operation, a log is placed in the infeed unit and is moved axially forward toward the center skinner assembly. The rate of speed through the debarker can be controlled and varied by the operator by means of controls on the control panel 64, which controls control the motor 58. The annular tank is rotated by the motor 156, which drives the belt 170 and the skinner arms are revolved by the tank. As the end of the log abuts the arms, the arms are spread outwardly to receive the log, due to the askew-angle shape of the arms and the revolving motion thereof. The skinning beads move between the bark and the wood and the combination of the revolving motion of the arms and the axial movement of the log moves the beads over the entire log to skin the bark therefrom. The log is carried from the skinner assembly by the outfeed unit, the speed of which is controlled by the operator.

The skinner assembly can be raised and lowered by means of the hydraulic cylinders 138 so as to permit rapid centering of each log within the passage 112. Such centering of the log contributes to the effective removal of bark from logs of all diameters, shapes and sizes.

It is to be particularly noted that the skinner arms are constantly acted on by the fluid pressure medium in the tank, through the cylinder and piston connection between the interior of the tank and the skinner arm. The cylinders, while shown in attachment to the inner peripheral wall 106 of the tank, may be mounted on the sides of the tank with connections to the tank, or may be otherwise arranged and connected with relation to the interior of the tank.

Because of the construction of the cylinders and pistons and the arrangement of the packing cups, the compressed air from the annular tank reservoir is never exhausted, thereby affording a constant pressure of substantially equal velocity at any point of the piston travel.

While the preferred form of this invention has been shown and described herein, other forms may be realised as coming within the scope of the appended claims.

What is claimed is:

1. A log-skinning machine comprising a fixed supporting frame, an annular rotary reel assembly having a central passage for the axial movement of logs therethrough, means mounting the reel assembly in the frame for rotary movement, means for rotating the reel assembly, a plurality of askew-shaped arms pivotally mounted at one end to the reel assembly and extending radially inwardly therefrom into the passage and arranged in circumferentially spaced relation, bark-removing elements provided on the inner ends of the arms, a reservoir for fluid under pressure carried by the reel assembly, and means connected between the reservoir and the arms to maintain the arms under continuous constant pressure, said reservoir being in the form of an annular tank having a central passage for the logs and said arms being arranged within the tank passage and extending radially inwardly from the tank, and said means connected between the reservoir and the arms including open-ended

defining a reservoir for a fluid under pressure and having a central passage for the axial movement of material through the tank, means mounting the tank for rotary movement about the material, tool means pivotally carried by the tank and extending radially inwardly toward the center of the passage for acting on the material, means operatively connected between the tank and the tool means and constantly responsive to the fluid pressure in the tank for maintaining the tool means under continuous, constant pressure, and means for rotating the tank and the tool means about the material so that the tool means under pressure act on the material as the material passes through the passage in the tank, said means connected between the tank and the tool means including cylinders arranged radially of the tank and carried thereby, said cylinders being in free communication with the interior of the tank, pistons workably mounted in the cylinders, and connecting links pivotally connected between the pistons and the tool means.

3. A log-skinning machine comprising a framework, said framework including an intermediate section, a movable frame slidably mounted for vertical movement on said section, hydraulic means for vertically moving said movable frame, a rotary reel assembly, means rotatably mounting said assembly in the frame, said assembly having a passage for an axially fed log, a plurality of skinner arms pivotally carried by the reel assembly, and radially extending inwardly therefrom toward the center of the passage, said skinner arms having bark-removing elements provided on their inner ends for skinning the bark from the wood of the logs, means carried by the frame and connected to the reel assembly for rotating the reel assembly and the arms about a log moved axially through the passage, a reservoir for a fluid pressure medium carried by the reel assembly, and means in communication with the reservoir and responsive to the fluid pressure therein and operatively connected to the arms for maintaining the arms under continuous, constant pressure, said reservoir being in the form of an annular tank having a central passage aligned with the passage in the reel assembly, said reel assembly including a pair of spaced rings, rods transversely extending between and connecting said rings, sleeves circumposed on said rods, bolt elements carried by said sleeves, and means attaching said bolt elements to the annular tank for mounting the tank on the reel assembly.

4. A log-skinning machine comprising a framework, said framework including an intermediate section, a movable frame slidably mounted for vertical movement on said section, hydraulic means for vertically moving said movable frame, a rotary reel assembly, means rotatably mounting said assembly in the frame, said assembly having a passage for an axially fed log, a plurality of skinner arms pivotally carried by the reel assembly, and radially extending inwardly therefrom toward the center of the passage, said skinner arms having bark-removing elements provided on their inner ends for skinning the bark from the wood of the logs, means carried by the frame and connected to the reel assembly for rotating the reel assembly and the arms about a log moved axially through the passage, an annular tank for a fluid pressure medium surrounding the reel assembly and means in communication with the tank and responsive to the fluid pressure therein and operatively connected to the arms for maintaining the arms under continuous, constant pressure, said arms being substantially triangular and having major and minor ends, said major ends having transverse sleeves provided thereon, rods forming a part of the reel assembly and on which the sleeves are

means of the valve [illegible]. In this respect, one fluid pressure medium which has proved extremely workable is compressed air and an operator can easily refill the pressure tank by means of an ordinary air compressor.

In operation, a log is placed in the infeed unit and is moved axially forward toward the center skinner assembly. The rate of speed through the debarker can be controlled and varied by the operator by means of controls on the control panel **64**, which controls control the motor **58**. The annular tank is rotated by the motor **156**, which drives the belt **170** and the skinner arms are revolved by the tank. As the end of the log abuts the arms, the arms are spread outwardly to receive the log, due to the askew-angle shape of the arms and the revolving motion thereof. The skinning beads move between the bark and the wood and the combination of the revolving motion of the arms and the axial movement of the log moves the beads over the entire log to skin the bark therefrom. The log is carried from the skinner assembly by the outfeed unit, the speed of which is controlled by the operator.

The skinner assembly can be raised and lowered by means of the hydraulic cylinders **138** so as to permit rapid centering of each log within the passage **112**. Such centering of the log contributes to the effective removal of bark from logs of all diameters, shapes and sizes.

It is to be particularly noted that the skinner arms are constantly acted on by the fluid pressure medium in the tank, through the cylinder and piston connection between the interior of the tank and the skinner arms. The cylinders, while shown in attachment to the inner peripheral wall **106** of the tank, may be mounted on the sides of the tank with connections to the tank, or may be otherwise arranged and connected with relation to the interior of the tank.

Because of the construction of the cylinders and pistons and the arrangement of the packing cups, the compressed air from the annular tank reservoir is never exhausted, thereby affording a constant pressure of substantially equal velocity at any point of the piston travel.

While the preferred form of this invention has been shown and described herein, other forms may be realised as coming within the scope of the appended claims.

What is claimed is:

1. A log-skinning machine comprising a fixed supporting frame, an annular rotary reel assembly having a central passage for the axial movement of logs therethrough, means mounting the reel assembly in the frame for rotary movement, means for rotating the reel assembly, a plurality of askew-shaped arms pivotally mounted at one end to the reel assembly and extending radially inwardly therefrom into the passage and arranged in circumferentially spaced relation, bark-removing elements provided on the inner ends of the arms, a reservoir for fluid under pressure carried by the reel assembly, and means connected between the reservoir and the arms to maintain the arms under continuous constant pressure, said reservoir being in the form of an annular tank having a central passage for the logs and said arms being arranged within the tank passage and extending radially inwardly from the tank, and said means connected between the reservoir and the arms including open-ended cylinders fitted in the inner peripheral wall of the tank and arranged radially thereof, pistons slidably disposed in said cylinders and connecting links pivotally connected to the pistons and to the arms intermediate the inner and outer ends of the arms.

2. In a material-treating apparatus, an annular tank means operatively connected between the tank and the tool means and constantly responsive to the fluid pressure in the tank for maintaining the tool means under continuous, constant pressure, and means for rotating the tank and the tool means about the material so that the tool means under pressure act on the material as the material passes through the passage in the tank, said means connected between the tank and the tool means including cylinders arranged radially of the tank and carried thereby, said cylinders being in free communication with the interior of the tank, pistons workably mounted in the cylinders, and connecting links pivotally connected between the pistons and the tool means.

3. A log-skinning machine comprising a framework, said framework including an intermediate section, a movable frame slidably mounted for vertical movement on said section, hydraulic means for vertically moving said movable frame, a rotary reel assembly, means rotatably mounting said assembly in the frame, said assembly having a passage for an axially fed log, a plurality of skinner arms pivotally carried by the reel assembly, and radially extending inwardly therefrom toward the center of the passage, said skinner arms having bark-removing elements provided on their inner ends for skinning the bark from the wood of the logs, means carried by the frame and connected to the reel assembly for rotating the reel assembly and the arms about a log moved axially through the passage, a reservoir for a fluid pressure medium carried by the reel assembly, and means in communication with the reservoir and responsive to the fluid pressure therein and operatively connected to the arms for maintaining the arms under continuous, constant pressure, said reservoir being in the form of an annular tank having a central passage aligned with the passage in the reel assembly, said reel assembly including a pair of spaced rings, rods transversely extending between and connecting said rings, sleeves circumposed on said rods, bolt elements carried by said sleeves, and means attaching said bolt elements to the annular tank for mounting the tank on the reel assembly.

4. A log-skinning machine comprising a framework, said framework including an intermediate section, a movable frame slidably mounted for vertical movement on said section, hydraulic means for vertically moving said movable frame, a rotary reel assembly, means rotatably mounting said assembly in the frame, said assembly having a passage for an axially fed log, a plurality of skinner arms pivotally carried by the reel assembly, and radially extending inwardly therefrom toward the center of the passage, said skinner arms having bark-removing elements provided on their inner ends for skinning the bark from the wood of the logs, means carried by the frame and connected to the reel assembly for rotating the reel assembly and the arms about a log moved axially through the passage, an annular tank for a fluid pressure medium surrounding the reel assembly and means in communication with the tank and responsive to the fluid pressure therein and operatively connected to the arms for maintaining the arms under continuous, constant pressure, said arms being substantially triangular and having major and minor ends, said major ends having transverse sleeves provided thereon, rods forming a part of the reel assembly and on which the sleeves are rotatably disposed to pivot the arms to the reel assembly, said arms being askew shaped from their major to their minor ends.

5. In a log-skinning machine, an annular tank containing a fluid under pressure having a central passage for the axial movement of logs therethrough, bark-removing

elements carried by said tank and extending radially inwardly toward the center of the passage, cylinders mounted in the inner peripheral wall of said tank in open communication with the interior of the tank, pistons slidably mounted in said cylinders having connection with said bark-removing elements, said pistons being operated by the fluid pressure in said tank to maintain said bark-removing elements under constant pressure, and means for rotating said tank.

6. In a log-skinning machine, an annular tank containing a fluid under pressure having a central passage for the axial movement of logs therethrough, a plurality of askew-shaped arms pivotally mounted within the central passage of said tank, bark-removing elements mounted on the inner ends of said arms, cylinders mounted in the inner peripheral wall of said tank in open communication with the interior of the tank, pistons slidably mounted in said cylinders having connection with said arms, said pistons being operated by the fluid pressure in said tank to exert a constant pressure on said arms, and means for rotating said tank.

7. In a log-skinning machine, a rotary reel assembly having a central passage for the axial movement of logs therethrough, a plurality of askew-shaped arms pivotally mounted on said reel for movement towards the center of said passage, bark-removing elements mounted on the inner ends of said arms, an annular tank containing a fluid under pressure surrounding said reel and carried thereby, cylinders mounted in the inner peripheral wall of said tank having open communication with the interior of said tank, pistons slidable in said cylinders having connection with said arms, said pistons being operated by the fluid pressure in said tank to exert a constant pressure on said arms, and means for rotating said reel.

8. In a log-skinning machine, a rotary reel assembly having a central passage for the axial movement of logs therethrough, a plurality of askew-shaped arms pivotally mounted on said reel for movement towards the center of said passage, bark-removing elements mounted on the inner ends of said arms, an annular tank containing a fluid under pressure surrounding said reel and carried thereby, fluid pressure operated means mounted on the inner peripheral wall of said tank in communication with the interior of said tank, said means having connection with said arms to exert a constant pressure on the arms, and means for rotating said reel.

9. In a log-skinning machine as described in claim 8 wherein said last mentioned means includes a drive belt trained around the outer peripheral wall of said tank, and means for driving said belt.

10. In a log-skinning machine, an annular tank containing a fluid under pressure having a central passage for the axial movement of logs therethrough, a plurality of askew-shaped arms pivotally mounted within the central passage of said tank having slots in their inner ends at substantially right angles to the pivot axis of said arms, a tool mounted in the slot of each arm having on its end a cylindrical bead for engagement with the log, fluid pressure operated means mounted on the inner peripheral wall of said tank in communication with the interior of said tank, said means having connection with said arms to exert a constant pressure on the arms, and means for rotating said tank.

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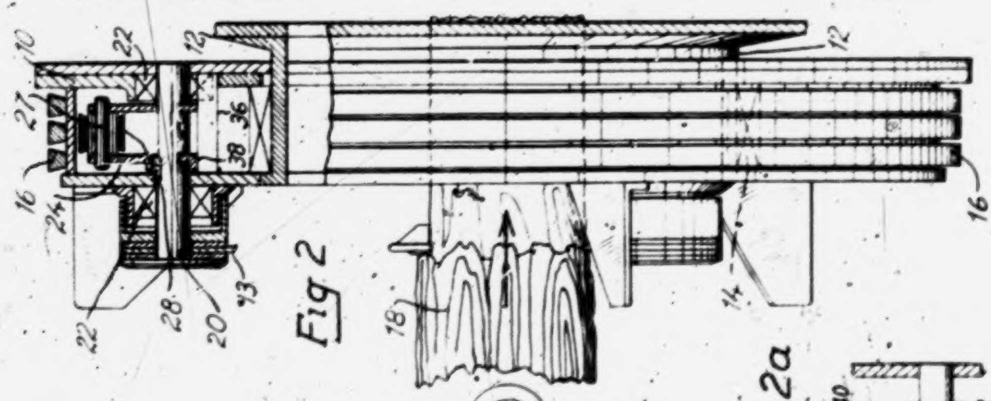
ROTARY DEBARKER HAVING PIVOTAL BARK-REMOVING TOOLS BIASED BY ELASTIC RUBBER

Filed March 22, 1954 4 Sheets-Sheet 1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38
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22
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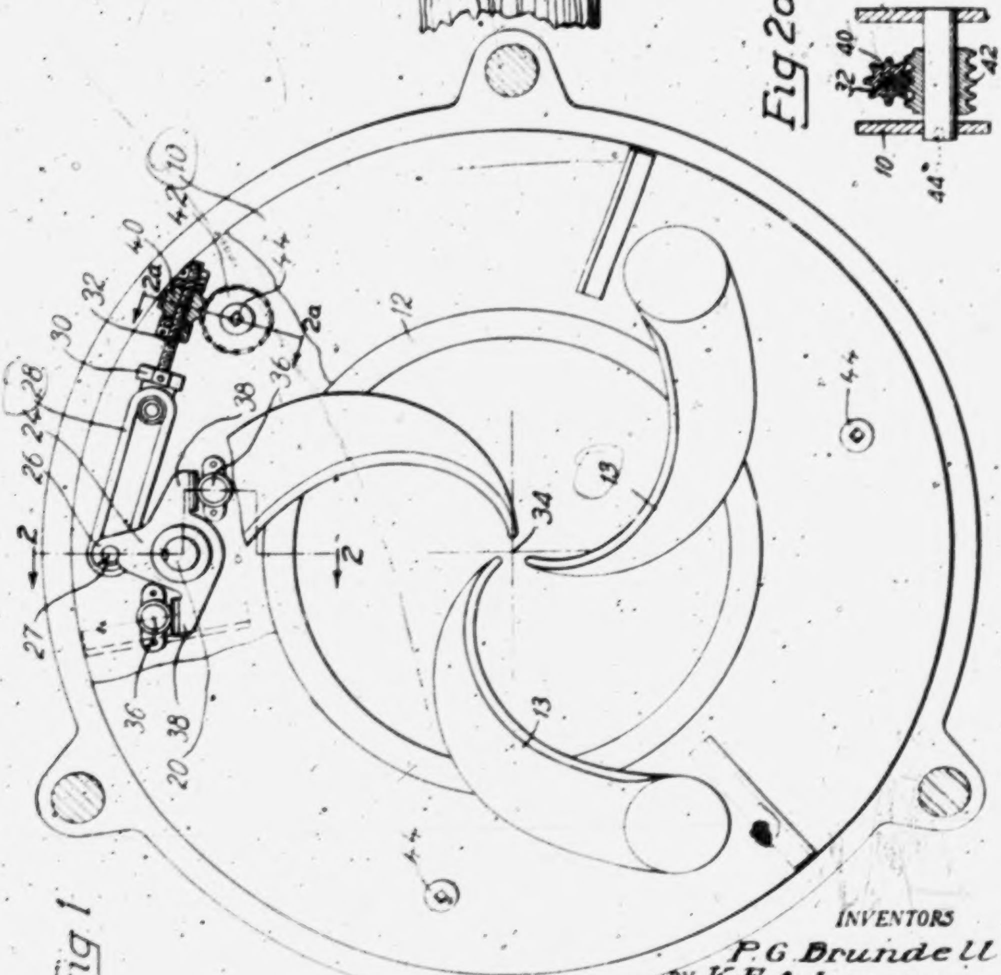
18
14
16

Fig 2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32
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44

Fig 2a

10
42
40
44
32
2a
30
2a
36
28
12
38
24
26
36
34
13
2
2
44
27
13
36
38
20
44

Fig 1

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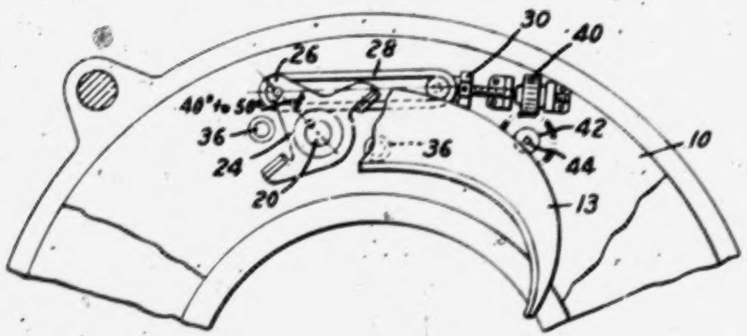
March 26, 1957 P. G. BRUNDELL ET AL **2,786,499**

ROTARY DEBARKER HAVING PIVOTAL BARK-REMOVING
TOOLS BIASED BY ELASTIC RUBBER

Filed March 22, 1954 4 Sheets-Sheet 2

Fig. 1a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40
26
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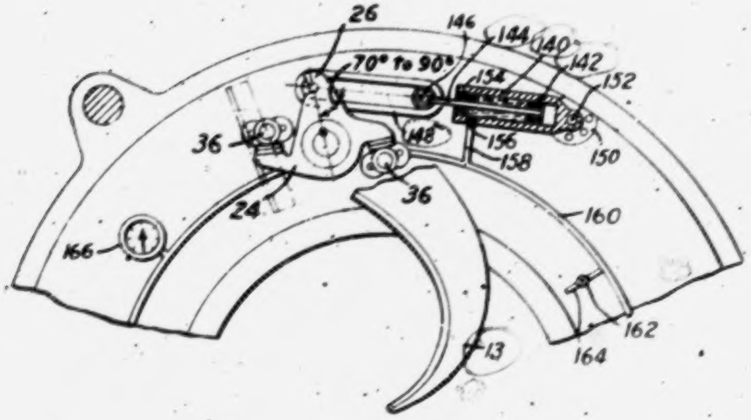
40° to 50°
36
24
20
36
42
44
10
13

Fig. 1b


26
146
144
140
142
152
70° to 90°
154
148
36
156
158
150
24
36
160
166
162
164
13

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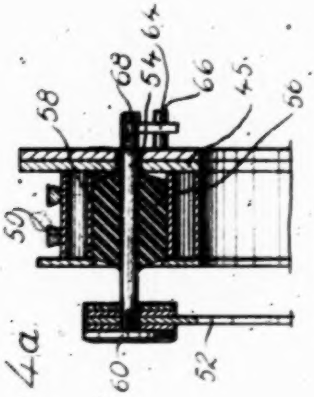
ROTARY DEBARKER HAVING PIVOTAL BARK-REMOVING
TOOLS BIASED BY ELASTIC RUBBER

Filed March 22, 1954 4 Sheets-Sheet 3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64
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45
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52

Fig 4a

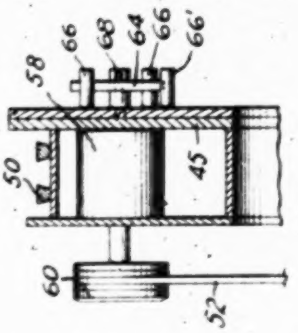
58
66
68
64
66
66'
50
45
60
52

Fig 4

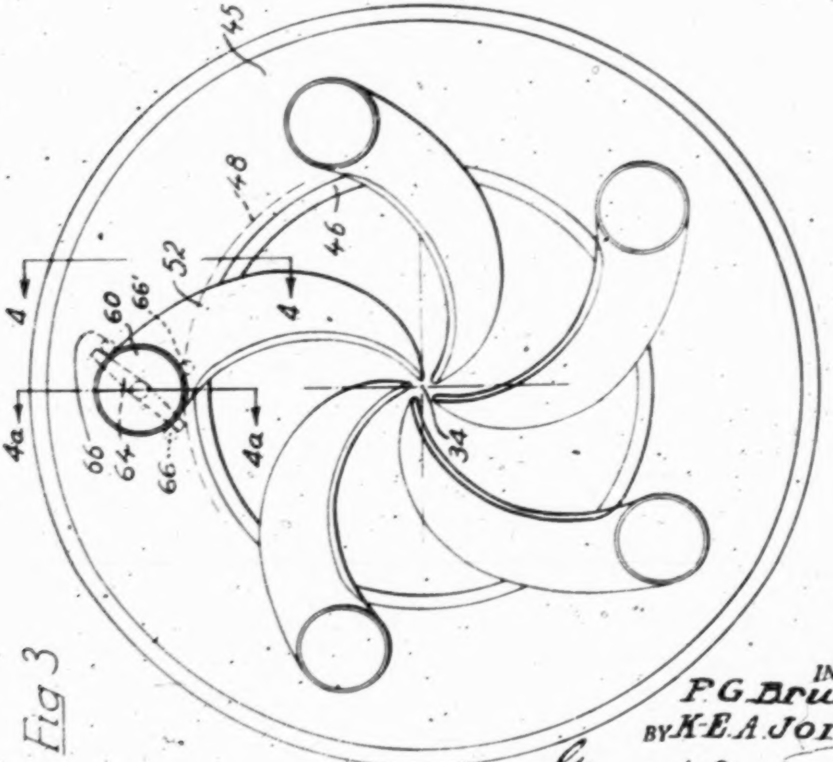
45
48
46
52
4
4
60
66'
4a
4a
66
64
66
34

Fig 3

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March 26, 1957 P. G. BRUNDELL ET AL 2,786,499

ROTARY DEBARKER HAVING PIVOTAL BARK-REMOVING
TOOLS BIASED BY ELASTIC RUBBER

Filed March 22, 1954 4 Sheets-Sheet 4

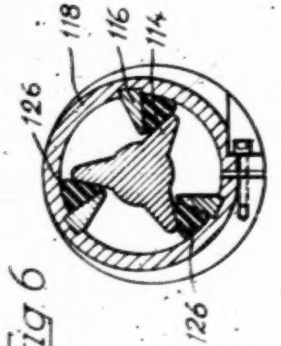
118
116
114
126
126

Fig 6

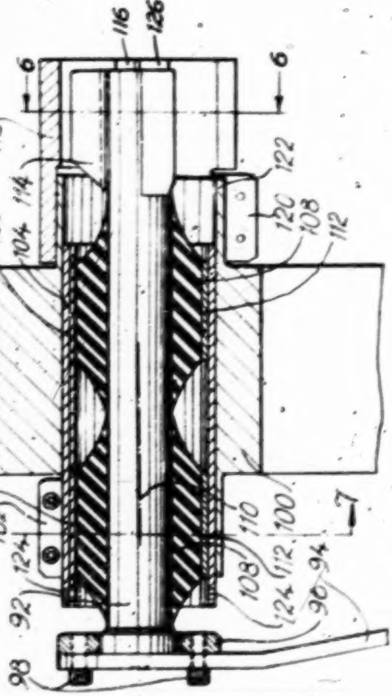
116
126
6
6
118
122
114
106
104
120
108
112
7
106
102
124
110
100
7
108
124
112
90
94
92
98

Fig 5

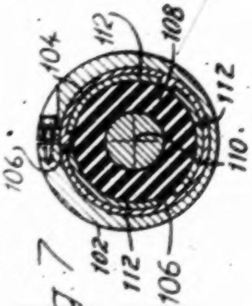
104
112
108
112
106
110
102
112
106

Fig 7

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ROTARY DEBARKER HAVING PIVOTAL BARK-REMOVING TOOLS BIASED BY ELASTIC RUBBER

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Application March 22, 1954, Serial No. 417,814

Claims priority, application Sweden March 30, 1953

14 Claims. (Cl. 144—208)

During recent years a number of debarking machines of the hollow-head type have been constructed for debarking pulpwood and timber. These mchines are such that successive logs are fed through the hollow-head of the machine along a straight path and without rotation, while a plurality of tools, mounted in a frame or rotor which rotates around the path of travel of the logs, are resiliently pressed against a log with such force that the bark is removed along helical paths by a frictional or shearing action. The resilient force pressing the tools against the logs has hitherto been generated by means of compressed air, balance weights or steel springs.

The present invention is principally characterized by the use of solid elastic materials for the actuation of each tool, carried by a swingable arm, so that, if straight lines are drawn from the point or points of attachment of this material to the rotary frame to its point or points of attachment to the tool arm or to levers connected to pivot shafts of the tool arms, such straight lines will always lie within the elastic material. The actuating force thus is effected directly and without any special means such as spiral winding and the like, since either the stretching of elongate elastic material will produce tensile stress or the application of torque to a bushing of elastic material will produce shearing stress.

The resilient elastic force is generated by means of shearing or tension in a suitable elastomer, preferably natural rubber compounded with carbon black. The use of such material gives results comparable to the use of either steel springs or compressed air, but avoids the problems of leakage that always accompanies the use of compressed air. In comparison with steel springs the rubber provides a damping effect which prevents troublesome vibrations, whereas steel springs tend to oscillate longitudinally and also transversely when the tools ride over an irregular log surface. The actuation of the tool by rubber means is extraordinarily smooth which is particularly apparent in comparison with machines using balance weights for the actuation of the tools. The structure of the machine can be made much lighter due to the fact that it is not necessary to pay the same attention to fatiguing shock stresses as by machines using another form of actuation of the tools. Due to the light weight of the rubber member itself in relation to the desired actuating force, its small demand of space and the indirect decrease of weight due to the fact that the construction further can be made lighter it has become

trating certain angular relationships of the parts shown in Figure 1,

Figure 1*b* is a fragmentary view similar to the upper portion of Figure 1 but illustrating a modified form of means for adjusting the force applied to the debarking tools,

Figure 2 is a fragmentary side view partly in elevation and partly in section with the section being taken on lines 2—2 of Figure 1,

Figure 2*a* is a fragmentary sectional view taken along lines 2*a*—2*a* of Figure 1,

Figure 3 is a view similar to Figure 1 but illustrating a modified arrangement of debarking tools and the means for applying force thereto,

Figures 4 and 4*a* are fragmentary views partly in elevation and partly in section of the upper part of Figure 3, as taken along lines 4—4 and 4*a*—4*a*, respectively, but omitting the stationary frame,

Figure 5 is a fragmentary view illustrating a modified form of mounting and force-applying means for the tools,

Figure 6 is a cross-sectional view taken along lines 6—6 of Figure 5, and

Figure 7 is a cross-sectional view taken along lines 7—7 of Figure 5.

In Figures 1 and 2, **10** designates an annular rotor rotatably journalled in a stationary frame **12** by means of a bearing **14**. The rotational movement of the rotor **10** is effected by means of V belts **16**. Logs **18** are fed seriatim through the center of the rotor in a straight path by any known feeding means. In the rotor are mounted three barking tools carried by swingable arms **13**, the tool-carrying ends of the arms **13** being continuously biased toward an axis of rotation **34** of the rotor **10**. These tools may be of arbitrary type but preferably are made in such a manner that they remove the bark by means of shearing, the swingable arms being of such a shape that when they are contacted by an oncoming log, they are automatically swung outward as they ride over the butt end of the log, the tools thus being moved onto the peripheral surface of a log without making any change in the force that initially biases the arms toward the rotor axis. Shafts **20** of these arms are journaled in bearings **22** in the rotor **10**. The shafts **20** are connected with levers **24** having outwardly extending arms **26**, in each of which arms is a hold or pin **27** for one or several ring-shaped rubber members **28**. This hold is preferably journaled on a needle bearing in order that the rubber will not become worn by sliding when the swingable arm and thereby also the hold or pin pivots. The pivoting angle of the arm generally amounts to about 30 to 40 degrees. It is preferable to arrange the arm **26** of the lever **24**, when the tool is in its inner position, so that an interior angle between a plane containing the axis of the shaft **20** and the hold or pin **27** and the acting line of the tensive force of the rubber will fall within a range of about 70 to 90 degrees, Figure 1*b*. When the tool moves from the minimum to the maximum diameter of the log the increase of the tensive force of the rubber is compensated by a corresponding decrease of the effective lever, i. e. the perpendicular distance between the acting line of the tensive force and the axis of the shaft of the swingable arm. In this manner a much smaller rubber length is required for keeping the actuating force

ROTARY DEBARKING MACHINE WITH BARK-REMOVING TOOLS BIASED BY ELASTIC RUBBER

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The resilient elastic force is generated by means of shearing or tension in a suitable elastomer, preferably natural rubber compounded with carbon black. The use of such material gives results comparable to the use of either steel springs or compressed air, but avoids the problems of leakage that always accompanies the use of compressed air. In comparison with steel springs the rubber provides a damping effect which prevents troublesome vibrations, whereas steel springs tend to oscillate longitudinally and also transversely when the tools ride over an irregular log surface. The actuation of the tool by rubber means is extraordinarily smooth which is particularly apparent in comparison with machines using balance weights for the actuation of the tools. The structure of the machine can be made much lighter due to the fact that it is not necessary to pay the same attention to fatiguing shock stresses as by machines using another form of actuation of the tools. Due to the light weight of the rubber member itself in relation to the desired actuating force, its small demand of space and the indirect decrease of weight due to the fact that the construction further can be made lighter it has become possible to produce a lightweight machine. Some different embodiments of the invention are shown as examples in connection with the following figures.

Figure 1 is a fragmentary view of a debarking machine with parts broken away for clarity as viewed from the direction of log feed and illustrating one form of the invention as regards means for applying the debarking tools to the logs,

Figure 1*a* is a fragmentary view diagrammatically illustrating a portion of Figure 1 but illustrating a modified form of means for adjusting the force applied to the debarking tools,

Figure 2 is a fragmentary side view partly in elevation and partly in section with the section being taken on lines 2—2 of Figure 1,

Figure 2*a* is a fragmentary sectional view taken along lines 2*a*—2*a* of Figure 1,

Figure 3 is a view similar to Figure 1 but illustrating a modified arrangement of debarking tools and the means for applying force thereto,

Figures 4 and 4*a* are fragmentary views partly in elevation and partly in section of the upper part of Figure 3, as taken along lines 4—4 and 4*a*—4*a*, respectively, but omitting the stationary frame,

Figure 5 is a fragmentary view illustrating a modified form of mounting and force-applying means for the tools,

Figure 6 is a cross-sectional view taken along lines 6—6 of Figure 5, and

Figure 7 is a cross-sectional view taken along lines 7—7 of Figure 5.

In Figures 1 and 2, **10** designates an annular rotor rotatably journalled in a stationary frame **12** by means of a bearing **14**. The rotational movement of the rotor **10** is effected by means of V belts **16**. Logs **18** are fed seriatim through the center of the rotor in a straight path by any known feeding means. In the rotor are mounted three barking tools carried by swingable arms **13**, the tool-carrying ends of the arms **13** being continuously biased toward an axis of rotation **34** of the rotor **10**. These tools may be of arbitrary type but preferably are made in such a manner that they remove the bark by means of shearing, the swingable arms being of such a shape that when they are contacted by an oncoming log, they are automatically swung outward as they ride over the butt end of the log, the tools thus being moved onto the peripheral surface of a log without making any change in the force that initially biases the arms toward the rotor axis. Shafts **20** of these arms are journaled in bearings **22** in the rotor **10**. The shafts **20** are connected with levers **24** having outwardly extending arms **26**, in each of which arms is a hold or pin **27** for one or several ring-shaped rubber members **28**. This hold is preferably journaled on a needle bearing in order that the rubber will not become worn by sliding when the swingable arm and thereby also the hold or pin pivots. The pivoting angle of the arm generally amounts to about 30 to 40 degrees. It is preferable to arrange the arm **26** of the lever **24**, when the tool is in its inner position, so that an interior angle between a plane containing the axis of the shaft **20** and the hold or pin **27** and the acting line of the tensive force of the rubber will fall within a range of about 70 to 90 degrees, Figure 1*b*. When the tool moves from the minimum to the maximum diameter of the log the increase of the tensive force of the rubber is compensated by a corresponding decrease of the effective lever, i. e. the perpendicular distance between the acting line of the tensive force and the axis of the shaft of the swingable arm. In this manner a much smaller rubber length is required for keeping the actuating force within permissible limits at the outer and inner position of the tool than if the lever is arranged so that said perpendicular distance remains constant. When the tool is disposed in its outermost position, the best relation is obtained when the plane containing the axis of shaft **20** and of hold or pin **27** forms an interior angle of about 40 to 50 degrees with the line of action of the tensive force, see Figure 1*a*. The rubber band **28** is at its outer end connected with a holder **30**, which by means of a screw **32** can be displaced in relation to the rotor **10** so that the initial force that biases the barking tool can be varied for different barking conditions. Other ways to vary the initial biasing force, which can be combined with the displaceable holder **30** comprises removing or adding rubber bands **28**, and selecting rubber bands having a different modulus of elasticity. The movement of the swingable arm **13** towards the rotation axis **34** of the rotor is limited by contact between stops **36**, mounted on the rotor **10** and preferably provided with rubber cushions, and two arms **38** of the lever **24**. The change in the tensive force of the rubber member **28** is initially effected when the screw **32** is displaced by rotation of a worm gear **40** mounted in suitable bearings and secured to the rotor, through the threaded center of which gear the screw passes. The worm gear **40** is in its turn rotated by a worm screw **42** which is also mounted on the rotor and which can be turned by a suitable key in the keyhole **44**. As an example it may be mentioned that in a barking machines intended for logs having a diameter of 2" to 16", each tool required three rubber rings each having a square section of 2 cm.^{2}. The effective length of the rubber in unstretched condition was 80 mm. The weight of all rubber members for the setting amounted to about 0.35 kg. The modulus of elasticity of the rubber was 16 kg./cm.^{2}. As a comparison it may be mentioned that the weight for corresponding steel springs amounts to about 15 kg. The arrangement with balance weights and air-pressure cylinders respectively will be still heavier. Because of the small weight of the rubber used in the arrangement described, the influence of centrifugal force will be small in comparison with that obtained when using a steel spring.

Figure 1*b* illustrates a modified arrangement for regulating the tension of the rubber bands. In this figure an endless rubber band **148** has one end secured to the pivot or pin **27** while its other end is connected to a stud means **146** that is carried by the end of a piston rod **144** secured to a piston **142** displaceable in a cylinder **140**. The cylinder is connected at one end to a pin **152** that is mounted in bearings or holding means **150** secured to the rotor whereby the cylinder **140** can rock about an axis parallel to the axis of the rotor. A stuffing box **154** closes the opposite end of cylinder **140** and the piston rod **144** passes therethrough. In order to introduce fluid into the cylinder **140** in front of piston **142** a flexible conduit **158** communicates with an inlet **156** in the cylinder. The flexible conduit in turn is connected to a circular conduit **160** carried by the rotor and in turn in fluid communication with other cylinders like **140** that are associated with the other tool arms, not shown. A pressure gauge **166** is in communication with the circular conduit **160** and to introduce fluid into the circuit a conduit **164** communicates with the circular conduit **160**. A control valve **162** is mounted in the conduit **164**. It is believed clear that liquid can be forced into the hydraulic system by hand pump, not shown, adapted for coupling with the conduit **164**. Inasmuch as the liquid circuit is in communication with all of the piston cylinders, introducing the liquid under pressure at one point will place the same pressure in each cylinder so that the tension of the rubber bands **148** will be equal for each tool. Any differences between the rubber bands as occasioned by different settings will automatically be compensated for. The pressure gauge **166** will furnish a reading that is proportional to the actuating force of a tool against a log.

It is clear therefore that both in Figures 1 and 1*b* the endless rubber band constitutes an elastically deformable means for applying force to the tools during debarking and that by means of axial movement of the screw **32** or the piston **142** the amount of tension in the bands and thus the force applied to the tools can be adjusted to suit different debarking conditions.

rubber in the construction of the barking machine as not only the biasing force but also the journaling of the swingable arms is effected by means of rubber. The barking machine according to Figure 3 is provided with five bark-removing tools and has a rotor **45**, a stationary frame **46**, a rotor bearing **48** and a driving device **50** in the same manner as described in connection with Figure 1. Shafts **54** of the swingable arms **52** are fixed by means of vulcanization in preferably cylindrical rubber sleeves **56** attached to the rotor **45** by means of tubular metal jackets **58**. The shaft **54** of the swingable arm is provided at its front end with an enlarged end portion against which the swingable arm **52** is fastened by a flat head screw **60**. A small lever **64** is mounted at its midportion on an opposite end of the shaft **54** and either engages a pair of stops **66** to limit the turning movement of the swingable arm towards the center, or engages a single stop **66'** to limit outward swinging movement of the arm. The lever **64** can be fixed in different positions in relation to the shaft by means of a screw **68** in order to obtain the desired initial biasing force of the barking tool. This is effected by turning the shaft **54** by any suitable device, through such an angle that a torque proportional to the desired initial biasing force is obtained from shearing stresses set up in the rubber. The swingable arm of the tool and the stop levers are thereafter screwed tight in relation to the shaft. The machine is now ready to be used for its purpose. This embodiment of the invention is characterized by an utmost soft running as the barking tools are not in metallic connection with the rotor. Another reason for the smooth running is that the rubber bushing permits a comparatively great flexibility in all directions for the swingable arms so that the tools can adapt themselves along the log surface. The flexibility of the bushing in the longitudinal direction of the log is desirable when using swingable arms formed for automatic opening upon contact with the butt end of an oncoming log. Some further advantages include an extreme simplicity in construction by requiring a small number of parts, an insensibility to the climate, and operability under rough conditions in the forest. Furthermore ordinary bearing friction is avoided as well as lubrication, and in addition the rubber bushing does not require maintenance. Due to the small external diameter of the rubber bushing the dimensions of the rotor can be decreased to a minimum.

In Figure 5 a shaft **92** to which a barking tool arm **94** is attached by means of a flange **96** and bolts **98** is surrounded by a sleeve **104** attached to a hollow head **100** by means of a clamping ring **102**. On the inner side of this sleeve there are three longitudinally arranged ridges **106**, Figure 7. To the shaft **92** there are attached by vulcanization two rubber bushings **108** of the same size, and each having concave end walls which progressively decrease in diameter as they curve away from one another and toward the shaft **92**. Preferably the lengths of any two lines which lie parallel to an axis **110** of the shaft **92** and which extend between said concave end walls and within said bushings, is made inversely proportional to their distances from said axis **110** of the shaft **92**. By doing this the permissible turning angle for the barking tool in relation to the hollow head will be the greatest possible without causing any cylindrical section of the rubber to have less resistance to axial stresses along the axis **110** than the section closest to the shaft **92**. The provision of two bushings coupled in parallel will result in an increased resistance against forces which tend to rock the shaft **92** out of its concentric relation with sleeve **104**. To the outside of each of the bushings **108**, are vulcanized three peripherally spaced sections **112** of a sleeve member. During manufacture the diameter of the bushings are such that they have to be pressed into the able arm **13** towards the rotation axis **34** of the rotor is limited by contact between stops **36**, mounted on the rotor **10** and preferably provided with rubber cushions, and two arms **38** of the lever **24**. The change in the tensive force of the rubber member **28** is initially effected when the screw **32** is displaced by rotation of a worm gear **40** mounted in suitable bearings and secured to the rotor through the threaded center of which gear the screw passes. The worm gear **40** is in its turn rotated by a worm screw **42** which is also mounted on the rotor and which can be turned by a suitable key in the keyhole **44**. As an example it may be mentioned that in a barking machines intended for logs having a diameter of 2" to 16", each tool required three rubber rings each having a square section of 2 cm.². The effective length of the rubber in unstretched condition was 80 mm. The weight of all rubber members for the setting amounted to about 0.35 kg. The modulus of elasticity of the rubber was 16 kg./cm.². As a comparison it may be mentioned that the weight for corresponding steel springs amounts to about 15 kg. The arrangement with balance weights and air-pressure cylinders respectively will be still heavier. Because of the small weight of the rubber used in the arrangement described, the influence of centrifugal force will be small in comparison with that obtained when using a steel spring.

Figure 1*b* illustrates a modified arrangement for regulating the tension of the rubber bands. In this figure an endless rubber band **148** has one end secured to the pivot or pin **27** while its other end is connected to a stud means **146** that is carried by the end of a piston rod **144** secured to a piston **142** displaceable in a cylinder **140**. The cylinder is connected at one end to a pin **152** that is mounted in bearings or holding means **150** secured to the rotor whereby the cylinder **140** can rock about an axis parallel to the axis of the rotor. A stuffing box **154** closes the opposite end of cylinder **140** and the piston rod **144** passes therethrough. In order to introduce fluid into the cylinder **140** in front of piston **142** a flexible conduit **158** communicates with an inlet **156** in the cylinder. The flexible conduit in turn is connected to a circular conduit **160** carried by the rotor and in turn in fluid communication with other cylinders like **140** that are associated with the other tool arms, not shown. A pressure gauge **166** is in communication with the circular conduit **160** and to introduce fluid into the circuit a conduit **164** communicates with the circular conduit **160**. A control valve **162** is mounted in the conduit **164**. It is believed clear that liquid can be forced into the hydraulic system by hand pump, not shown, adapted for coupling with the conduit **164**. Inasmuch as the liquid circuit is in communication with all of the piston cylinders, introducing the liquid under pressure at one point will place the same pressure in each cylinder so that the tension of the rubber bands **148** will be equal for each tool. Any differences between the rubber bands as occasioned by different settings will automatically be compensated for. The pressure gauge **166** will furnish a reading that is proportional to the actuating force of a tool against a log.

It is clear therefore that both in Figures 1 and 1*b* the endless rubber band constitutes an elastically deformable means for applying force to the tools during debarking and that by means of axial movement of the screw **32** or the piston **142** the amount of tension in the bands and thus the force applied to the tools can be adjusted to suit different debarking conditions.

Figures 3 and 4 illustrate a further modification in which an elastically deformable means is utilized. In this arrangement there is shown a further concept in the use of same manner as described in connection with Figure 1. Shafts **54** of the swingable arms **52** are fixed by means of vulcanization in preferably cylindrical rubber sleeves **56** attached to the rotor **45** by means of tubular metal jackets **58**. The shaft **54** of the swingable arm is provided at its front end with an enlarged end portion against which the swingable arm **52** is fastened by a flat head screw **60**. A small lever **64** is mounted at its midportion on an opposite end of the shaft **54** and either engages a pair of stops **66** to limit the turning movement of the swingable arm towards the center, or engages a single stop **66'** to limit outward swinging movement of the arm. The lever **64** can be fixed in different positions in relation to the shaft by means of a screw **68** in order to obtain the desired initial biasing force of the barking tool. This is effected by turning the shaft **54** by any suitable device, through such an angle that a torque proportional to the desired initial biasing force is obtained from shearing stresses set up in the rubber. The swingable arm of the tool and the stop levers are thereafter screwed tight in relation to the shaft. The machine is now ready to be used for its purpose. This embodiment of the invention is characterized by an utmost soft running as the barking tools are not in metallic connection with the rotor. Another reason for the smooth running is that the rubber bushing permits a comparatively great flexibility in all directions for the swingable arms so that the tools can adapt themselves along the log surface. The flexibility of the bushing in the longitudinal direction of the log is desirable when using swingable arms formed for automatic opening upon contact with the butt end of an oncoming log. Some further advantages include an extreme simplicity in construction by requiring a small number of parts, an insensibility to the climate, and operability under rough conditions in the forest. Furthermore ordinary bearing friction is avoided as well as lubrication, and in addition the rubber bushing does not require maintenance. Due to the small external diameter of the rubber bushing the dimensions of the rotor can be decreased to a minimum.

In Figure 5 a shaft **92** to which a barking tool arm **94** is attached by means of a flange **96** and bolts **98** is surrounded by a sleeve **104** attached to a hollow head **100** by means of a clamping ring **102**. On the inner side of this sleeve there are three longitudinally arranged ridges **106**, Figure 7. To the shaft **92** there are attached by vulcanization two rubber bushings **108** of the same size, and each having concave end walls which progressively decrease in diameter as they curve away from one another and toward the shaft **92**. Preferably the lengths of any two lines which lie parallel to an axis **110** of the shaft **92** and which extend between said concave end walls and within said bushings, is made inversely proportional to their distances from said axis **110** of the shaft **92**. By doing this the permissible turning angle for the barking tool in relation to the hollow head will be the greatest possible without causing any cylindrical section of the rubber to have less resistance to axial stresses along the axis **110** than the section closest to the shaft **92**. The provision of two bushings coupled in parallel will result in an increased resistance against forces which tend to rock the shaft **92** out of its concentric relation with sleeve **104**. To the outside of each of the bushings **108**, are vulcanized three peripherally spaced sections **112** of a sleeve member. During manufacture the diameter of the bushings are such that they have to be pressed into the sleeve **104**. By doing this the rubber can be given desired compression resulting in a better durability. The sleeve sections **112** fit between the ridges **106** and prevent relative rotation between the sleeve 104 and the periphery of the bushings when the shaft is turned. On the rear end of the shaft 92 are provided three wings 114 which have limited movement between ridges 116 provided in a surrounding sleeve 118, Figure 6. By means of a clamping device 120 this sleeve is attached to a collar 122 on the hollow head. The movement of the barking tool towards the axis 34 of the hollow head is braked by rubber members 126 provided between the ridges 116 and the wings 114. The end point of the movement of the debarking tool can be determined as desired by loosening the clamping device 120 and then turning the sleeve 118 until the desired position of the tool is reached. The desired initial actuating force on the tool is brought about by loosening the clamping ring 102 after which the sleeve 104 is turned by aid of a key that fits a key hole 124 until the desired actuating force is attained, after which the clamping ring is tightened. The above described construction is simple and easy to manufacture and very robust. The initial actuating force of the tool can easily be regulated within desired limits. The device is very compact especially in its radial dimensions. For example, a debarking machine for a smallest log dimension of 1" and a largest dimension of 11", the diameter of the shaft 92 was 1" and the inner diameter of the sleeve 104 2⅛". The total greatest length of the rubber bushings 108 along the shaft 92 was 7". The torsion modulus of the elastomer used is preferably between 3.5 and 8 kg./cm.^{2} (50 to 115 p. s. i.) and is preferably chosen to be between 5 and 6 kg./cm.^{2} (70 to 85 p. s. i.). Turning angles from inner to outer position of the debarking tool can amount up to 45° without the resulting difference in actuating force exceeding permissible limits of variation.

It is therefore clear that the present invention provides a debarking machine of the type in which successive logs are fed end to end through a rotary annular frame while the logs are restrained against rotation. A plurality of arms are mounted on the frame for movement toward and away from the axis thereof and elastically deformable means are carried by the frame and operably coupled to the arms for exerting a resilient force thereon to apply debarking tools or bark removing portions of the arms against a log with sufficient intensity regardless of irregularities in log contour or bark to remove the bark from the logs as the frame rotates thereabout. The elastically deformable means is housed within the rotary frame in one form and constitutes at least one endless rubber band for each arm operable by tension. Means are provided for adjusting the tension exerted by the bands to suit different debarking conditions.

In another form of the invention the elastically deformable means constitute rubber bushings simultaneously supporting a shaft carrying each arm and placed under shear stress so as to apply force to the arm. In other words, the rubber bushings are vulcanized internally to a pin or pivot operably connected with the arms and externally either directly or indirectly to a portion of the rotary frame. In these forms, means are provided for adjusting the shear stress to thereby adjust the force applied to the arms.

What we claim is:

1. In a debarking machine, a rotatably mounted annular frame through which logs to be debarked are fed in end-to-end relation and while restrained against rotation, a plurality of debarking tools carried by the frame, turnable shaft means carried by the frame, extending parallel to the axis of rotation of the frame and mounting the tools for movement toward and away from the axis of the frame in paths containing a plane transverse to said

from logs, and co-operable stop means respectively carried by the frame and shafts to limit the movement of said shafts and thus of said tools toward the axis of the frame.

2. In a debarking machine as claimed in claim 1, in which the solid-elastic-rubber-material means constitutes rubber strip means adjustably connected in tension between the frame and each shaft.

3. In a debarking machine as claimed in claim 1, in which the solid-elastic-rubber-material means constitutes at least one rubber bushing connected in shear between the frame and each tool.

4. In a debarking machine as claimed in claim 1, and the means mounting each tool including an arm, each arm having an outer end, a pin secured to the outer end and extending parallel to the axis of the frame and the solid-elastic-rubber-material means constituting for each arm at least one rubber bushing having its inner surface vulcanized to the pin and means including vulcanization fixing the outer surface of the bushing to the frame, and means for adjustably imparting shear stress to each bushing in order to initially adjust said turning and actuating force.

5. In a debarking machine as claimed in claim 4, in which each rubber bushing is of varying cross section with the width decreasing from the central portion thereof toward the opposite ends.

6. In a debarking machine of the type in which a succession of logs to be debarked are fed forwards in end-to-end relation while restrained against rotation through a rotary annular frame, the improvements comprising, a plurality of debarking tools carried by the frame, pivot means mounting the tools for movement toward and away from the axis of rotation of the frame, and solid-elastic-rubber-material strip means adjustably connected in tension between the frame and each of the tools for applying force thereto in a direction extending toward the axis of the frame so as to apply the tools to a log with sufficient intensity regardless of irregularities in log contour or bark to remove such bark.

7. In a debarking machine as claimed in claim 6, in which swingable arms carry the tools, the pivot means mounting the tools including shafts journalled on the frame and extending parallel to the axis thereof, said arms being mounted on said shafts, said shafts being equally spaced around the frame, each of said arms having substantial length, the solid-elastic-rubber-material strip means normally biasing the arms inwards in the direction toward the axis of the frame and stop means carried respectively by said shafts and said frame to limit the inward movement of the arms under the force generated by said strip means so that the tools carried by the respective arms are maintained out of contact with one another.

8. In a debarking machine of the type having a rotary annular frame through which a succession of logs to be debarked are fed forwards in end-to-end relation while restrained against rotation, the improvements comprising, a plurality of debarking tools, shafts journalled on the frame, said shafts extending parallel to the axis of rotation of the frame and corresponding in number to the number of tools, an arm mounted on each shaft so as to turn therewith, said arms carrying the tools, solid-elastic-rubber-material means operably connected with each of the arms for applying turning force thereto in a direction to move the tool carried thereby toward the axis of the frame and to apply the tool to a log with sufficient intensity regardless of irregularities in log contour or bark to remove such bark, lever means connected to each shaft, said solid-elastic-rubber-material means

122 on the hollow head. The movement of the barking tool towards the axis 34 of the hollow head is braked by rubber members 126 provided between the ridges 116 and the wings 114. The end point of the movement of the debarking tool can be determined as desired by loosening the clamping device 120 and then turning the sleeve 118 until the desired position of the tool is reached. The desired initial actuating force on the tool is brought about by loosening the clamping ring 102 after which the sleeve 104 is turned by aid of a key that fits a key hole 124 until the desired actuating force is attained, after which the clamping ring is tightened. The above described construction is simple and easy to manufacture and very robust. The initial actuating force of the tool can easily be regulated within desired limits. The device is very compact especially in its radial dimensions. For example, a debarking machine for a smallest log dimension of 1" and a largest dimension of 11", the diameter of the shaft 92 was 1" and the inner diameter of the sleeve 104 2⅛". The total greatest length of the rubber bushings 108 along the shaft 92 was 7". The torsion modulus of the elastomer used is preferably between 3.5 and 8 kg./cm.^{2} (50 to 115 p. s. i.) and is preferably chosen to be between 5 and 6 kg./cm.^{2} (70 to 85 p. s. i.). Turning angles from inner to outer position of the debarking tool can amount up to 45° without the resulting difference in actuating force exceeding permissible limits of variation.

It is therefore clear that the present invention provides a debarking machine of the type in which successive logs are fed end to end through a rotary annular frame while the logs are restrained against rotation. A plurality of arms are mounted on the frame for movement toward and away from the axis thereof and elastically deformable means are carried by the frame and operably coupled to the arms for exerting a resilient force thereon to apply debarking tools or bark removing portions of the arms against a log with sufficient intensity regardless of irregularities in log contour or bark to remove the bark from the logs as the frame rotates thereabout. The elastically deformable means is housed within the rotary frame in one form and constitutes at least one endless rubber band for each arm operable by tension. Means are provided for adjusting the tension exerted by the bands to suit different debarking conditions.

In another form of the invention the elastically deformable means constitute rubber bushings simultaneously supporting a shaft carrying each arm and placed under shear stress so as to apply force to the arm. In other words, the rubber bushings are vulcanized internally to a pin or pivot operably connected with the arms and externally either directly or indirectly to a portion of the rotary frame. In these forms, means are provided for adjusting the shear stress to thereby adjust the force applied to the arms.

What we claim is:

1. In a debarking machine, a rotatably mounted annular frame through which logs to be debarked are fed in end-to-end relation and while restrained against rotation, a plurality of debarking tools carried by the frame, turnable shaft means carried by the frame, extending parallel to the axis of rotation of the frame and mounting the tools for movement toward and away from the axis of the frame in paths containing a plane transverse to said axis, solid-elastic-rubber-material means adjustably connected between each shaft and the frame for applying a resilient turning and actuating force to each of the shafts to move the respective tool in the direction toward the axis of the frame with a force sufficient to remove bark

rubber strip means adjustably connected in tension between the frame and each shaft.

3. In a debarking machine as claimed in claim 1, in which the solid-elastic-rubber-material means constitutes at least one rubber bushing connected in shear between the frame and each tool.

4. In a debarking machine as claimed in claim 1, and the means mounting each tool including an arm, each arm having an outer end, a pin secured to the outer end and extending parallel to the axis of the frame and the solid-elastic-rubber-material means constituting for each arm at least one rubber bushing having its inner surface vulcanized to the pin and means including vulcanization fixing the outer surface of the bushing to the frame, and means for adjustably imparting shear stress to each bushing in order to initially adjust said turning and actuating force.

5. In a debarking machine as claimed in claim 4, in which each rubber bushing is of varying cross section with the width decreasing from the central portion thereof toward the opposite ends.

6. In a debarking machine of the type in which a succession of logs to be debarked are fed forwards in end-to-end relation while restrained against rotation through a rotary annular frame, the improvements comprising, a plurality of debarking tools carried by the frame, pivot means mounting the tools for movement toward and away from the axis of rotation of the frame, and solid-elastic-rubber-material strip means adjustably connected in tension between the frame and each of the tools for applying force thereto in a direction extending toward the axis of the frame so as to apply the tools to a log with sufficient intensity regardless of irregularities in log contour or bark to remove such bark.

7. In a debarking machine as claimed in claim 6, in which swingable arms carry the tools, the pivot means mounting the tools including shafts journalled on the frame and extending parallel to the axis thereof, said arms being mounted on said shafts, said shafts being equally spaced around the frame, each of said arms having substantial length, the solid-elastic-rubber-material strip means normally biasing the arms inwards in the direction toward the axis of the frame and stop means carried respectively by said shafts and said frame to limit the inward movement of the arms under the force generated by said strip means so that the tools carried by the respective arms are maintained out of contact with one another.

8. In a debarking machine of the type having a rotary annular frame through which a succession of logs to be debarked are fed forwards in end-to-end relation while restrained against rotation, the improvements comprising, a plurality of debarking tools, shafts journalled on the frame, said shafts extending parallel to the axis of rotation of the frame and corresponding in number to the number of tools, an arm mounted on each shaft so as to turn therewith, said arms carrying the tools, solid-elastic-rubber-material means operably connected with each of the arms for applying turning force thereto in a direction to move the tool carried thereby toward the axis of the frame and to apply the tool to a log with sufficient intensity regardless of irregularities in log contour or bark to remove such bark, lever means connected to each shaft, said solid-elastic-rubber-material means comprising at least one endless rubber band for each arm, means coupling one end of each band to each lever means in a manner to apply said turning force thereto and means mounting the other end of each band for movement toward and away from the associated lever means so as

to permit adjustment of the tension exerted by the bands on the levers and thus on the arms to thereby adjust the force applied to the tools to different barking conditions.

9. In a debarking machine of the type having a rotary annular frame through which a succession of logs to be debarked are fed forwards in end-to-end relation while restrained against rotation, the improvements comprising, a plurality of debarking tools carried by the frame, pivot means mounting the tools for movement toward and away from the axis of rotation of the frame, solid-elastic-rubber-material means connected between the frame and the tools to apply force to each of the latter in a direction extending toward the axis of the frame and to apply each of the tools to a log with sufficient intensity regardless of irregularities in log contour or bark to remove such bark, said solid-elastic-rubber-material means comprising at least one endless rubber band operably connected under tension to each tool at one end and means adjustably connecting an opposite end of each band to the frame for adjusting the tension of the band.

10. In a debarking machine as claimed in claim 9, in which the last-mentioned means includes a screw extending in line with an initial line of force applied by each band when the tools are disposed in their innermost or inoperative position, and means for axially displacing the screw to adjust the tension acting along the initial line of force.

11. In a debarking machine as claimed in claim 10, in which the last-mentioned means comprises for each band a piston, a cylinder for each piston, means mounting the cylinders on the rotor, and means for introducing fluid into each cylinder behind the piston therein in order to alter the position of the pistons and thus vary the tension of the bands.

12. In a debarking machine of the type having a rotary annular frame through which a succession of logs to be debarked are fed forwards in end-to-end relation while restrained against rotation, the improvements comprising, a plurality of debarking tools, pivot means mounting the tools for movement toward and away from the axis of rotation of the frame, elastically deformable means supported by the frame and operably connected with the tools for applying force to each of the latter in a direction extending toward the axis of the frame so as to apply each of the tools to a log with sufficient intensity regardless of irregularities in log contour or bark to remove such bark, each debarking tool comprising a swingable arm, said pivot means including a shaft for each arm journalled in the rotary frame and extending parallel to the axis thereof, said shaft being connected to one end of the arm, the opposite end of the arm constituting a log-contacting portion of the tool, lever means connected to each shaft and including a first lever arm extending in a direction radially outward from a journalling axis of the shaft and a pair of lever arms extending from opposite sides of a plane containing the axis of the shaft and said radially outward direction, the elastically deformable means comprising at least one endless rubber band, means connecting one end thereof to the first lever arm, means connecting the other end to the rotary frame so that an initial line of force of the rubber band makes an interior angle of between 70° and 90° with an initial radially outward direction of said first lever arm, when the swingable arm is in its innermost position; stop means cooperating with the said pair of lever arms to limit the inward movement of the swingable arm to said innermost position and said first lever arm having a length such that when the swingable arm is in its outermost position an interior angle formed between a terminal line of force of the rubber band and a terminal radially outward direction of said first lever arm, is between 40° and 50°.

13. A debarking machine comprising a rotary annular frame through which successive logs to be debarked are adapted to be fed in end-to-end relation while restrained against rotation, a plurality of tool-carrying arms disposed for swinging movement in paths containing a plane transverse to the axis of rotation of the frame, a shaft for each arm, said shafts extending parallel to the axis of the frame and being distributed around and journalled in the frame, means connecting one end of each arm to its shaft, a tool at the other end of each arm, and solid-rubber biasing means adjustably connected between the frame and each arm and constructed and arranged to apply turning force to the shaft to urge the arm inwardly so as to urge the tool toward the axis of the frame and to apply the tool to a log being fed with sufficient intensity regardless of irregularities in log contour and bark to remove such bark.

14. A debarking machine as claimed in claim 13 and a lever means connected to each shaft, each said solid-rubber biasing means comprising an elongate rubber body, means connecting one end of each body to one of said lever means, means carried by the frame and mounting the other end of each body for movement toward and away from the associated lever means so as to adjustably tension each body, and stop means carried by the frame for limiting the movement of the lever means and thus of the tools toward the axis of the frame.

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No. 293

In the
Supreme Court of the United States

October Term 1962

CARL W. MULLIS ENGINEERING AND MANUFACTURING
COMPANY, INC., *Petitioner*,

vs.

THOMAS W. NICHOLSON, *Respondent*.

BRIEF OF RESPONDENT OPPOSING PETITION FOR WRIT OF CERTIORARI

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In the

Supreme Court of the United States

Carl W. Mullis Engineering and Manufacturing Company, Inc., *Petitioner*,
vs.
Thomas W. Nicholson, *Respondent*.

No. 293

BRIEF OF RESPONDENT OPPOSING PETITION FOR WRIT OF CERTIORARI

PERTINENT STATUTES

The statement of petitioner under the heading "Statutory Provisions" on pages 3 and 4 of the Petition for a Writ of Certiorari has omitted one very important statute which should be considered by this Honorable Court if the petition for certiorari should be granted, namely,

> 35 U.S.C., Sec. 103. **Conditions for patentability: non-obvious subject matter.** A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

MODIFIED STATEMENT OF THE CASE

The "Statement of the Case" by petitioner includes on page 5 of the petition the statement,

> "Nicholson thereupon appealed to the United States Court of Appeals for the Fourth Circuit, which after argument held that the District Court was correct in every respect except in its holding that claim 8 of the Mullis patent was valid."

The United States District Court Judge had held that the Nicholson Accumat machine infringed claim 8 of the Mullis patent here in question and the Court of Appeals for the Fourth Circuit *did not reach this question.* Instead, the Appellate Court held claim 8 of the Mullis patent to be invalid *without any comment* upon the question as to whether if that claim had been valid it would have been infringed by the Nicholson Accumat barker.

Also, the Fourth Circuit Court of Appeals ruled upon only one of the grounds asserted by Nicholson as a basis for invalidity of the Mullis patent here in issue. Various other grounds establishing invalidity of the Mullis patent were also urged, but the Appellate Court found it unnecessary to rely on them in order to adjudicate the Mullis patent here in issue to be invalid.

If this Honorable Court should grant the petition for certiorari, and if thereafter this Honorable Court should reverse the ruling made by the Fourth Circuit Court of Appeals as to the invalidity of claim 8 of the Mullis patent, it would be necessary to remand the case to such Appellate Court for consideration of the other grounds on which it was further asserted claim 8 of the Mullis patent was invalid, and also, perhaps, for consideration of the question as to whether the Nicholson Accumat barker constituted an infringement of claim 8 of the Mullis patent. Consideration of these questions was, of course, rendered unnecessary by the decision reached by the Appellate Court.

At the bottom of page 5 the petition states that Brundell patent 2,786,499 was,

> "cited *and relied upon* by the Examiner in the Patent Office during the prosecution of the application resulting in the Mullis patent." (Italics supplied)

It is respectfully submitted that said Brundell patent was not "relied upon" by the Examiner in the Patent Office with respect to claim 8 of the Mullis patent here in issue because, if the Examiner had properly "*relied upon*" that patent, he would have refused the allowance of that claim and it would *not* have appeared in the Mullis patent as issued. What consideration the Patent Office Examiner gave the Brundell patent in relation to claim 8 of the Mullis patent, if any, does not appear, but in view of the logical and sound analysis of the Brundell patent and its application to claim 8 of the Mullis patent given by the Appellate Court in holding such claim invalid, it appears evident that the Patent Office Examiner gave little or no consideration to the Brundell patent with respect to that patent claim.

At the bottom of page 6 of the petition reference is made to the Mullis patent rotating tank 104 filled with air under pressure. Claim 8 of the Mullis patent recites "an annular tank containing a fluid under pressure." The Nicholson Accumat barker did not have such a tank. The claim also specifies

> "fluid pressure operated means mounted on the inner peripheral wall of said tank in communication with the interior of said tank."

The Nicholson Accumat barker did not employ such fluid pressure operated means.

At the middle of page 7 the petition states with respect to gas pressure devices for moving barking arms, that

> "the *usual* construction had been one in which the ga-

> was supplied from a stationary source." (Italics supplied)

This statement is equivocal because prior art patents in the record of this case disclose constructions in which gas under pressure is carried by a rotary ring for the purpose of actuating log barking arms. A statement as to what the alleged "usual" construction was is therefore misleading.

The same comment applies to the statement at the bottom of page 7 of the petition with respect to what was "usual in prior constructions" for supplying gas under pressure to the ring. Prior art patents in the record disclose entirely comparable arrangements for supplying such gas under pressure to the ring.

In discussing the Brundell patent at the middle of page 8 the petitioner asserts that the

> "cylinder 140 contains a liquid, such as oil:"

Actually the specification of the Brundell patent at column 3, line 44, states

> "In order to introduce *fluid* into the cylinder 140 in front of piston 142 a flexible conduit 158 communicates with an inlet 156 in the cylinder. The flexible conduit in turn is connected to a circular conduit 160 carried by the rotor and in turn in *fluid* communication with other cylinders like 140 that are associated with the other tool arms, not shown. A pressure gauge 166 is in communication with the circular conduit 160 and to introduce *fluid* into the circuit a conduit 164 communicates with the circular conduit 160." (Italics supplied)

While it is true that liquid is mentioned as an example in other portions of the description, the generic term "fluid" to include gas under pressure is recited in the portion of the specification quoted. Consequently it is entirely reasonable that the cylinder 140 may contain gas under pressure instead of liquid under pressure. It is therefore clear that petitioner asserts an unduly restricted interpretation on the Brundell patent.

At the bottom of page 8 the petition states that,

> "The oil in the cylinders 140 is incompressible, and serves merely as a mechanical connection between the various rubber bands,"

but, as pointed out above, the teaching of the Brundell patent is not *restricted* to oil but the language used in the description of the Brundell mechanism is sufficiently broad to encompass the use of *either* compressed gas or liquid under pressure in the generic term "fluid" used in the portion of the description quoted above from the Brundell patent.

Moreover, appellant's Statement of the Case omits mention of any prior art patents other than Brundell patent 2,786,499. Actually the decision by the Fourth Circuit Court of Appeals refers also to Emery patent 2,477,922, Whitlock patent 2,591,751 and Nicholson patent 2,802,495, although not discussing them in detail, and these patents should be given consideration by this Honorable Court if the petition for certiorari is granted.

QUESTION PRESENTED IS IMPROPER BASIS FOR GRANTING CERTIORARI

The statement of the question presented for review on page 2 of the petition is the usual one in nearly any patent infringement suit as to whether a particular patent claim is invalid over certain specific prior art. There is nothing unusual in this analysis and comparison.

It is not even contended by petitioner that any special reason, such as enumerated in Rule 19 of this Honorable Court, is here involved.

There is here no conflict of decisions by different courts of appeal.

There is here no question of Federal law, important or otherwise, not previously settled by this Honorable Court.

There is here no Federal question decided in conflict with applicable decisions of this Honorable Court.

The Fourth Circuit Court of Appeals did not depart from the accepted and usual course of judicial proceedings.

On the contrary, the District Court in this case fell into error, as admitted by the petitioner in his brief, with respect to the subject matter here in point, and the Appellate Court simply corrected that error and reversed the District Court, as it was the place and duty of the Appellate Court to do.

Looking at the alleged question presented for review on pages 2 and 3 of the petition somewhat more closely, petitioner points out that the District Court found the claim to be valid. Such finding was based on an erroneous interpretation of prior art and in correcting that interpretation it was, of course, entirely logical, proper and necessary for the Appellate Court to reverse the holding of the District Court as to the validity of the claim.

As a second point relating to the question for review petitioner states that the patent relied upon by the Court of Appeals was one considered by the Examiner in the United States Patent Office. The Court of Appeals did not rely entirely on a single patent in its holding of invalidity. Moreover, there is nothing in the record to indicate what "consideration" was given to this patent by the Patent Office Examiner with respect to the claim of the patent here in question.

As to the third point on page 3 of the petition relating to the question. Nicholson did not; and did not purport to present a *patent* expert witness and there was no examination of that witness with respect to claim 8 of the Mullis patent here in issue. Such examination of a *layman* with respect to a *patent claim* would, of course, have been improper. Moreover, whether a particular individual had ever seen a machine of the patented type is not probative as to validity of a patent on such machine. Whether or not a patented machine has ever been constructed is completely immaterial as to the validity of a patent on that machine. There is no requirement in the law that a machine be constructed prior to a patent being granted on it.

Relative to item 4 it is entirely immaterial whether the construction and operation of the patented machine was or was not explained to the District Court in oral testimony. A patent is a document which speaks for itself and the statute 35 U.S.C. Sec. 112 requires that,

> "The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention."

If the description of a patent is properly presented the operation and construction of the machine disclosed can be understood by the court *from the patent itself*, except in unusual cases, and there is no contention by the petitioner that this is such a case. If the description in the patent is *not* sufficiently complete to enable the court to understand its construction and operation in the usual case, the patent is invalid for the further reason that it does not comply with the statute quoted above.

In item 5 relative to the question presented for review, appearing on page 3 of the petition, petitioner complains that,

> "No evidence was introduced by the party attacking the validity of the patent as to the equivalency of the structure shown in the prior patent to that covered by the claim held invalid by the Court of Appeals."

Presumably the petitioner has reference to oral testimony. It is, however, the *disclosure of the prior art* in documentary form which constitutes the statutory bar to a patent, and such prior art documents are entirely competent to speak for themselves without the necessity of any interpretative oral testimony. This was the basis of the error into which the District Court fell, namely, improperly interpreting the prior art Brundell patent, 2,786,499, as admitted by petitioner in its petition, and it was this misinterpretation of that prior art patent which the Court of Appeals corrected in reversing the District Court. No oral testimony was necessary to reach the proper interpretation of the prior art patent and the conclusion of invalidity which necessarily followed.

Item 6 on page 3 of the petition, as to the question presented for review that the District Court actually saw the patented machine, is completely immaterial. There is no indication or contention in the petition that the Appellate Court did not understand the machine shown in the Mullis patent, or that observation of the machine was necessary to an understanding of it. Actually, the Mullis patent contains detailed drawings, as well as a description of the subject machine, which are quite understandable. Moreover, as has been mentioned above, whether a machine made the subject of a patent was or was not ever constructed is immaterial as far as the validity of the patent is concerned.

In summary, therefore, it is evident that the petition here is simply requesting that this Honorable Court give consideration to whether a claim on a particular patented machine is or is not valid over particular prior art. No new or unusual question of law is involved. A ruling on the question presented by the petition would not provide any appreciable guidance to lower courts in future patent cases which would warrant consideration of this case by this Honorable Court.

THE ALLEGED GROUNDS ARE AN INSUFFICIENT BASIS FOR GRANTING OF THE WRIT OF CERTIORARI

The only ground asserted by the petition as a basis for urging this Honorable Court to grant the writ is at page 9, that,

> "this case constitutes the decision of a Federal question in a way in conflict with applicable decisions of this Court, and also so far departs from the accepted and usual course of judicial proceedings as to call for an exercise of this Court's power of supervision."

Under this heading the petition makes reference to several Supreme Court cases without clearly pointing out where the decision of the Court of Appeals in the present case is in conflict with any of such prior decisions. In this connection it will be helpful to consider separately the several cases cited.

Graver Tank Co. v. Linde Air Products, 336 U.S. 271

At pages 10 and 11 of the petition the *Graver Tank* case is discussed with respect to the point that,

> "the District Court's findings and conclusions are not to be set aside unless clearly erroneous."

The converse of this statement is, of course, equally true that,

> It is the *duty* of the Appellate Court to *set aside* the findings and conclusions of the district court where they are "clearly erroneous,"

as petitioner admits that they were in the present case on page 11;

> "It is true that the District Court made an error in failing to appreciate that the Brundell patent showed in Fig. 1b an arrangement in which the pressure on the arms was equalized by an interconnection between them.".

The District Court simply failed to interpret the disclosure of the Brundell patent correctly, as is recognized by the petitioner itself. Such corrected interpretation was, of course, necessarily contrary to the findings of fact made by the District Court on this point and the conclusions drawn from such erroneous findings, which resulted in reversal of the District Court's conclusion as to the validity of claim 8 of the Mullis patent. Certainly the Court of Appeals for the Fourth Circuit can not be criticized for doing its appellate duty in this way.

Even if the District Court had not made findings of fact admitted by petitioner here to state an erroneous interpretation of the Brundell patent the *Graver Tank* case is not to be interpreted as forbidding an Appellate Court to consider interpretations made by a lower court and reverse them or revise them in appropriate cases. This aspect of the *Graver Tank* case has been considered by this Honorable Court in the later case of *The Great Atlantic & Pacific Tea Co. v. Supermarket Equipment Corporation*, 340 U.S. 147. In that case both the District Court and the Court of Appeals actually had concurred in their opinions as to the findings of fact, but the Supreme Court *reversed both lower courts*, stating

> "It is urged, however, that concurrence of two courts

> below, in holding the patent claims valid, concludes this Court. A recent restatement of the 'two-count rule' reads, 'A court of law such as this Court is, rather than a court for correction of errors in fact finding, cannot undertake to review concurrent findings of fact by two courts below in the absence of a very obvious and exceptional showing or error.' *Graver Tank Co. v. Linde Co.*, 336 U.S. 271, 275, 621 O.G. 5. The questions of general importance considered here are not contingent upon resolving conflicting testimony, for the facts are little in dispute. We set aside no finding of fact as to invention, for none has been made except as to the extension of the counter, which cannot stand as a matter of law."

So, in the instant case the District Court made here no finding of fact on the question of *invention* which the Appellate Court set aside.

It cannot properly be contended by petitioner, therefore, that the decision of the Fourth Circuit Court of Appeals here is in any way in conflict with the case of *Graver Tank Co. v. Linde Air Products*, 336 U.S. 721, as that case was interpreted by the later case of *The Great Atlantic & Pacific Tea Co. v. Supermarket Equipment Corporation*, 340 U.S. 147, with respect to the point raised by the petitioner.

***Commissioner v. Duberstein*, 366 U.S. 278**

The quotation given by petitioner from this decision on page 11 relates to

> "factual inferences from undisputed basic facts."

The basic fact here involved, which is undisputed, is that certain prior art patents existed. The District Court then drew "factual inferences" from such prior art. On that basis, as petitioner states on page 11,

> "the District Court drew the conclusion from the facts that the Mullis patent was valid."

Such "factual inferences" were, however, actually not "facts," but the inferences drawn by the District Court were erroneous as admitted by petitioner on page 11, as quoted above. Consequently, "the rule" in the case of *Commissioner v. Duberstein* does *not* apply in the present case because of such erroneous factual inferences drawn by the District Court.

The petitioner has failed to point out how the decision of the Appellate Court here was in conflict with the decision of *Commissioner v. Duberstein.*

Preceding the dicussion of the *Graver Tank* case and the *Duberstein* case, petitioner, on pages 9 and 10, makes reference to the point that,

1. The court actually saw the Mullis machine after the trial;
2. The witness Holekamp saw a Brundell patent machine;

and consequently concluded that the District Court did *not* base his decision "purely on documentary evidence." It cannot be disputed, however, and, in fact, is admitted by the petitioner, that the interpretation of the Brundell patent by the District Court was in error. There is no explanation by the petitioner how the fact that the District Court saw the Mullis machine has any bearing on his misinterpretation of the Brundell patent. Also, while Holekamp may have seen a machine such as disclosed in the Brundell patent, there was no testimony regarding the feature of this machine which was misinterpreted by the District Court. What the reason for the District Court's misinterpretation may have been is immaterial and of no interest to this Honorable Court, nor to any other District Court or Appellate Court which may be deciding a patent case.

In one breath the petitioner contends that there *was* evidence regarding the prior art which would foreclose the Court of Appeals from considering the facts found by the lower court, and in the next breath, at the bottom of page 12, petitioner states

> "No evidence was offered by him as to the applicability of the references to the claim."

Consequently, the interpretation of the prior art was up to the lower court in the first instance and up to the Appellate Court in the later instance, as that court commented with respect to the basis for the decision by the lower court:

> "His conclusion was 'not evolved from conflicting testimony but rather upon a comparative reading of the patents. Inasmuch as these documents are equally as available to us, the resolution of the question of patent-validity by the trial court is not as binding here as would be a factual ascertainment upon varying evidence * * *. Our examination convinces us that Brundell's patent, No. 2,786,499, filed March 22, 1954, issued March 26, 1957 clearly anticipated Mullis."

Thus, it is evident that the basis for the Appellate Court's decision was documentary interpretation involving no question of law constituting a proper basis for the granting of petitioner's request for a writ of certiorari.

Coupe v. Royer, 155 U.S. 565, 577

This case is cited at page 14 of the petition for the proposition that,

> "Patent claims should be construed to validate them if possible."

It is not clear to what portion of this long decision petitioner has reference with respect to this statement, but certainly it has not shown in this regard that the decision of the Appellate Court *as to the validity of the Mullis patent* is in conflict with the *Coupe v. Royer* case.

Actually, if a review of the matter of *infringement* of the Mullis patent by the Nicholson Accumat barker were here under consideration petitioner would be correct that the decision of the District Court was in conflict *on this point* with the decision of the Supreme Court in *Coupe v. Royer*.

In finding infringement of claim 8 of the Mullis patent by the Nicholson Accumat machine, which point was not considered in the decision of the Court of Appeals, the District Court simply ignored limitations in the Mullis patent claim. This is contrary to the pronouncement of this Honorable Court in the case of *Coupe v. Royer* at the middle of page 576, as follows:

> "The principle of construction which we think applicable to the plaintiff's patent is that such construction must be in conformity with the *self-imposed limitations which are contained in the claims*. Such claims are the measure of their right to relief. * * * the courts have no right to enlarge a patent beyond the scope of its claim as allowed by the Patent Office. * * * The courts should be careful not to enlarge by construction the claims which the Patent Office has admitted, and which the patentee has acquiesced in, beyond the fair interpretation of its terms." (Italics supplied)

In the present case the District Court simply disregarded limitations in claim 8 of the Mullis patent in finding infringement, yet these are the very limitations which petitioner here contends should be given effect *and even interpreted in a more restricted fashion* by "recourse to the specification and drawings" (Petition, p. 14) in order to urge this Court to reverse the decision of the Fourth Circuit Court of Appeals that the Mullis claim is invalid. Perhaps the petitioner feels that this is a safe position to take in connection with this petition because it is not here asking that the question of infringement, as distinguished from validity, be reviewed by this Honorable Court.

In this connection, as stated at the top of page 14 of the petition, claim 8 of the Mullis patent uses the term "a fluid under pressure" and the Brundell patent at column 3, lines 44 and 48, as quoted above at page 4, also uses the term "fluid." In order to urge the validity of claim 8 the petitioner then contends that the word "fluid" in the Mullis claim

"should be construed to mean a gas" (Petition, p. 14)

while the term "fluid" as used by Brundell should be interpreted as a *liquid. But the fluid in the pipe interconnecting the barker arm actuators in the Nicholson Accumat barker also is a liquid, like Brundell,* and *not* a *gas* as disclosed by Mullis.

It is believed, therefore, that petitioner would have great difficulty showing that the decision of the Fourth Circuit Court of Appeals was inconsistent with the decision of *Coupe v. Royer.*

Hildreth v. Mastoras, 257 U.S. 27

This case is cited by petitioner as supporting his position that the presumption of validity of the Mullis patent is

> "strengthened where, as here, the prior art has been considered by the Patent Office as is shown by the list of references on the back of the Mullis patent."

The petition then states,

> "This rule has been recognized by this Court, in *Hildreth v. Mastoras*, 257 U.S. 27."

Actually, this position of the petitioner represents a misinterpretation both of the facts of the present case and of the holding of this Honorable Court in the *Hildreth* case.

In the *Hildreth* case the patent in question had been involved in an interference proceeding with *five other copending patent applications* in the Patent Office. As this Honorable Court commented in that case,

> "The controversy in the Patent Office lasted five years, was strenuously contested, and was carried to the Court of Appeals of the District of Columbia."

On page 32 appears the further comment,

> "This, as already said, is the claim which was framed in the Patent Office as the issue of the interference proceeding, and of which Dickinson was given priority over all. The presumption of priority and novelty which arises from the granting of a patent must have greatly increased weight when the claim of the inventor is subjected to such close and careful scrutiny under the stimulus of a heated contest."

In the present case the Mullis patent *was not involved in any interference*. Moreover, there was *no evidence* that *any* of the prior art cited by the Patent Office was considered at all *with respect to claim* 8 of the Mullis patent, which is here in issue.

On what basis then can the petitioner legitimately contend, as stated on page 9 of its petition, that the case of *Hildreth v. Mastoras* is a decision of this Court in conflict with the decision of the Court of Appeals in this case?

CONCLUSION

The only ground which the petitioner further urges for granting of this petition by this Honorable Court is the statement at page 9 of the petition that,

> "The Decision of the Court of Appeals in this case * * * so far departs from the accepted and usual course of judicial proceedings as to call for an exercise of this Court's power of supervision."

It is respectfully submitted that the foregoing discussion has amply established that the consideration given to this case by the Court of Appeals was simply that which would normally be expected of a reviewing court in a patent case where invalidity of a particular patent had been alleged on the basis of prior art. Certainly this procedure follows

> "the accepted and usual course of judicial proceedings."

Only if the Appellate Court had followed *any other* course could it properly have been contended that such court had departed from the "accepted and usual course" of appellate review proceedings.

Under all the circumstances, therefore, it is respectfully submitted that the petitioner has presented no valid ground for its petition for a writ of certiorari being granted, and such petition should therefore be denied.

Respectfully submitted,

Robert W. Beach

Attorney for Respondent.

CERTIFICATE OF SERVICE

It is hereby certified that three true copies of this Brief have been served on Jennings Bailey, Jr., by air mail, with postage prepaid, addressed to 1317 F Street Northwest, Washington 4, D.C., this 15th day of August, 1963.

ROBERT W. BEACH
Attorney for Respondent.